Regional Geography

THE BRITISH ISLES

BY

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'THE THREE SOUTHERN CONTINENTS,' 'THE BRITISH EMPIRE,' AND *'THE WORLD,'*
AND OF THE BEGINNERS' REGIONAL GEOGRAPHY: 'THE BRITISH ISLES,'
'ASIA, 'THE AMERICAS,' AND 'AFRICA' AND 'AUSTRALASIA.'

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PREFACE.

During recent years there has been a growing feeling that if geography is to be of educational, as well as of utilitarian, value the physical laws and phenomena which so largely control human activities must be explained as well as described to pupils as far as compatible with their mental capabilities. At the same time most modern geographers are agreed that what is generally called physical geography loses half its value when divorced from topographical and humanistic geography, and hence, whilst stating the most fundamental physical principles in the first part of the book, an attempt has been made at the same time to show the special bearing that these have on the scenery of our country and the life of the inhabitants. In the latter part of the book the countries constituting the United Kingdom have been divided into natural regions, since these form broader and more scientific units for description than the political divisions called counties.

A few maps have been introduced in order to insure a knowledge of those climatic and other distributions which are still too often omitted from school atlases. My thanks are due to Mr. H. J. Mackinder, Principal of the London School of Economics, for the idea of the diagrams on page 27, which resemble those given by him in 'Britain and the British Seas,' but are compiled from different data. Illustrations have been freely inserted in the belief that students of all ages can best learn many geographical facts from a careful observation of views selected to give an idea of various places and of different types of scenery.

The book will be found to contain sufficient information, with regard to the limited area described, for candidates for geographical examinations of the standard of London Matriculation, but might also well be used by pupils in the middle forms of schools under the careful guidance of their teachers.

In conclusion I have to thank Mr. G. G. Chisholm, M.A., B.Sc. (Edin.), Lecturer in Geography at Edinburgh University, for kindly revising the book in manuscript, and making several valuable suggestions.

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J. B. R.

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THE BRITISH ISLES.

POSITION, SIZE, AND SHAPE.

THE British Isles extend from about latitude 50° to 60° North, and rise from shallow seas, with a north-west front to the Atlantic Ocean and a south-east corner towards the mainland of Europe, from which Dover is separated by a strait only 21 miles across.

The insular character of the United Kingdom makes defence relatively easy, and yet it is not too far removed from Europe to have benefited by the influences of civilization which, entering from the Continent at the south-east corner, gradually spread over the country. Till the discovery and settlement of America, Britain practically stood on the oceanic border of the then known world; now it is found to lie nearly in the centre of the important land-masses, and so commands a splendid position for trade.

The British Isles rise from a submarine plateau, which is under 100 fathoms, or 600 feet, in depth. West of this the sea-floor slopes suddenly to a depth of 1,000 or more fathoms. To the shallowness of the seas around our shores, and the long inlets indenting them, are due the peculiarly high tides we enjoy, which so enhance the value of our harbours. The tides are highest in the Severn estuary, at Avonmouth the difference between high and low water being about 40 feet, while at London it is about 19 feet, and at Portsmouth 12 feet. The mass of piled-up water, due to the tidal wave of high 'spring' tides entering a narrowing estuary like the Severn, is called a 'bore.'

Very long ago what is now the submarine plateau was probably land, so that Ireland was joined to Great Britain and Great Britain to the Continent. The sea has simply drowned the connecting isthmuses, so that the United Kingdom chiefly consists of one large island, called Great Britain, 88,000 square miles in extent, and a smaller one, called Ireland, with an area of 32,000 square miles. The long and narrow shape of Great Britain is partly responsible for the former political separation of England and Scotland, but the tract of mountainous land between them also rendered union difficult in early days.

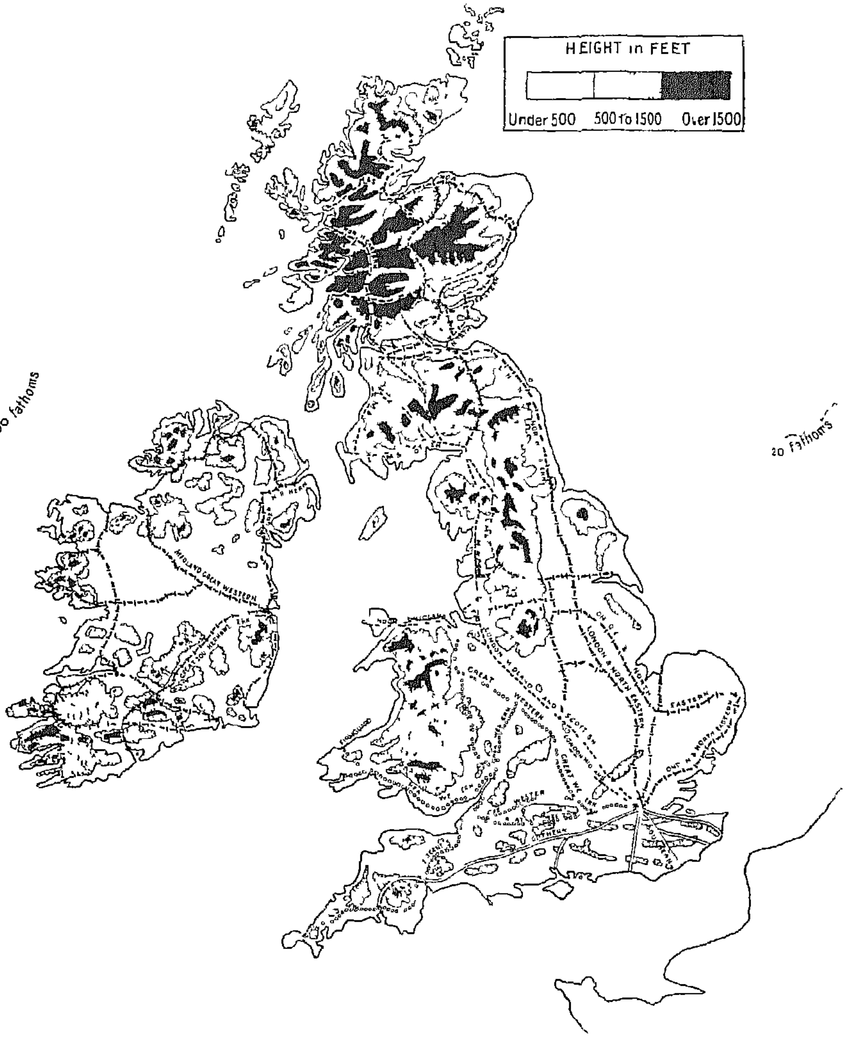
Owing to the slight width and deep inlets of Great Britain, no place is more than 70 miles from the sea. This is a great advantage to trade, as inland towns are able to receive goods from, and distribute them to, ports on the west and east coasts with almost equal facility. There are four places where, large estuaries being nearly opposite to each other on the east and west coasts, it has been possible to connect them by canals cut right across Great Britain, generally between rivers flowing in opposite directions. These canals join the Severn estuary with that of the Thames, the Mersey and Humber estuaries, the Clyde and Forth, and Loch Linnhe with the Moray Firth by the aid of a chain of lakes. The last, called the Caledonian Canal, can be used by fair-sized ships, as it is 17 feet deep ; but the others are only suitable for barges of about 3 to 6 feet in draught (see map, p. 9).

QUESTIONS AND SUGGESTIONS.

1. On an outline map of the British Isles insert the names of the seas and channels of water around them and of the chief inlets.
2. One degree of latitude is equal to about 69 miles. How far is it, then, from the equator to London, and from the Lizard to Cape Wrath ?
3. What is longitude ? How does the longitude of Greenwich affect the way in which time is reckoned in this country ?
4. What would be the advantages or disadvantages of a railway tunnel connecting England and France ?

RELIEF AND RIVER SYSTEM.

If you look at the map opposite showing the relief of the land, you will see that you can broadly divide Great Britain into the following areas : (1) The Highlands of Scotland, which lie north-west of a line from about the mouth of the Clyde to near Aberdeen. (2) The plain of Scotland, which crosses the country diagonally. (3) The Central Uplands of Great Britain, which include the Southern Uplands of Scotland, the Cheviots, the Pennines—from which the Cheviots are separated by the depression followed by the Tyne and Irthing rivers—and the Cumbrian group of mountains, which is only severed from the Pennines by the deep valleys of the Lune and Eden. (4) The Welsh Highlands. (5) The mountainous peninsula of Cornwall and Devon. (6) The rest of England, which is low and flat around the Wash, and in Cheshire between the



THE BRITISH ISLES RELIEF AND RAILWAYS.

The Railways of Great Britain are now arranged in four groups, known as The Southern, The Great Western; The London, Midland and Scottish; and The London and North-Eastern. Each group is indicated on the map by a line of different character.

The area shown in the North Sea as under 20 fathoms' deep is the Dogger Bank.

Pennines and Welsh mountains, and has an undulating diversified surface in the centre, south, and south-east. The hills crossing the central region follow a general south-west to north-east direction, as, for example, the Cotswolds and Chilterns, while in the south-east the Downs run east and west. The direction of all these hills depends on geological conditions (see pp. 14 and 86). (7) Ireland consists of a mountainous border with a central plain that reaches the east coast just north of Dublin.

The distinct physical characteristics of these areas have tended to develop different qualities in the inhabitants, who have therefore played different parts in the history of our country. Fortunately, however, the relief of the British Isles is such that communication is everywhere fairly easy, and, now that the various areas have been connected by railways, the different characteristics of the inhabitants, due partly to local physical conditions and isolation, are fast disappearing. Roads, and later railways, were easily made over the plains of England, Scotland, and Ireland, while river valleys defined routes through the more mountainous parts; and modern engineering, by means of bridges and tunnels, has even connected towns formerly separated by such estuaries as the Severn, Mersey, Forth and Tay, and by the Menai Straits. The ranges in England, moreover, are not high enough to form very serious obstacles to commerce nowadays (see map, p. 7).

As the highest mountains lie towards the north and west, the longest and most navigable rivers flow mainly southwards or eastwards. The longest rivers are the Shannon, 225 miles; the Severn, 210 miles; the Thames, 210 miles; and the Yorkshire Ouse, Great Ouse, and Clyde, all about 150 miles. Many rivers have been deepened for commercial purposes, besides being connected by canals (see map, p. 9).

SUGGESTIONS.

1. Mark the areas mentioned above on an outline map of the British Isles, shading the Highlands and ranges. Insert also the chief water partings.
2. Write an account of the relief and drainage of the district within a five-mile radius of your home. In doing this you will find it a help to look at the Ordnance Survey maps* of the district, and to go, if possible, to the top of a hill or high building, from which you can obtain a bird's-eye view over the neighbourhood.

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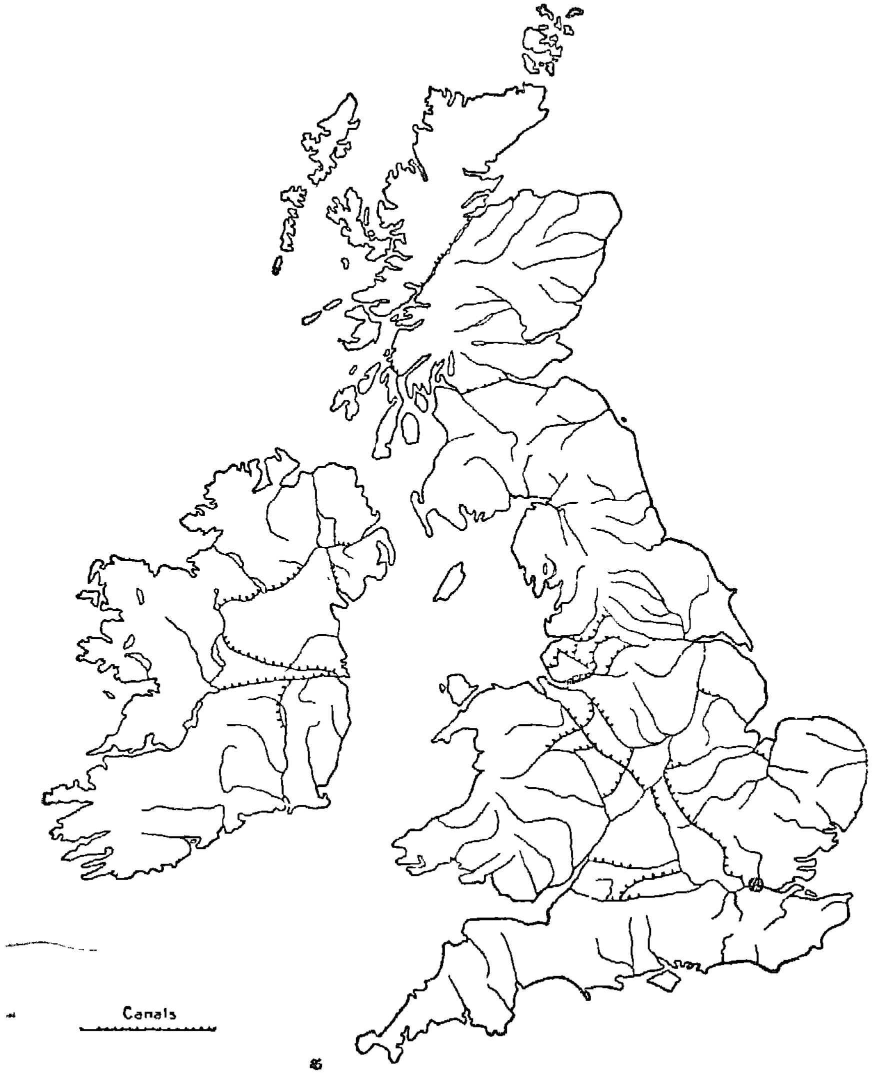
* These can be obtained in large numbers for educational purposes at low prices on application to the Director-General, Ordnance Survey, Southampton.



MAP SHOWING THE CHIEF RIVERS AND CANALS OF THE BRITISH ISLES.

The names of the rivers can be ascertained by comparing this map with those on pages 31, 51, and 111 (see also pages 6, 8, 54, 65, 70, 114, and 116).

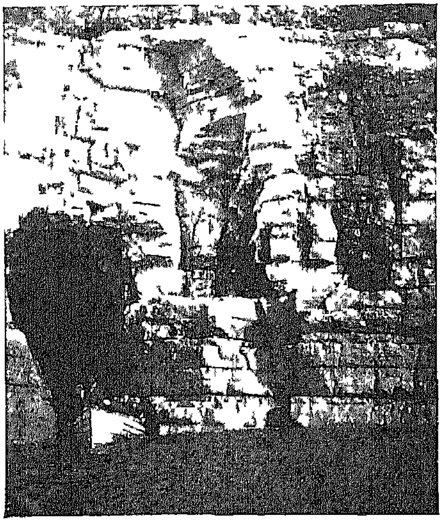
THE GEOLOGICAL STRUCTURE OF THE LAND.

What we call soil is only decomposed rocks, often mixed with decayed vegetable and animal matter, and underneath soil there is always solid rock. Rocks are broadly classified into Igneous, Sedimentary, and Metamorphic. Igneous rocks must have once been in a molten condition, due to great heat, and are therefore by name associated with fire.

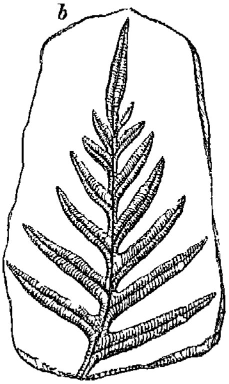
Sedimentary rocks are composed of sand and mud deposited by water just as sediment settles at the bottom of a glass of muddy water, and then consolidated by pressure. The hardened layers of mud or sand thus formed are called strata, and sedimentary rocks are sometimes called 'stratified rocks,' whereas igneous rocks are unstratified, and generally have a crystalline appearance, like granite. Limestone, sandstone, and chalk are common sedimentary rocks, and in these we frequently find remains or impressions of plants, shells, and animals of former times. Such petrified remains are called fossils, and they cannot be found in igneous rocks.

Metamorphic rocks are such as were originally formed by deposition in water, but were afterwards greatly altered by heat and pressure. Of this nature are various schists, which, like the igneous rocks, have a crystalline appearance, and marble, which was formerly limestone. The oldest rocks we know of are igneous and metamorphic.

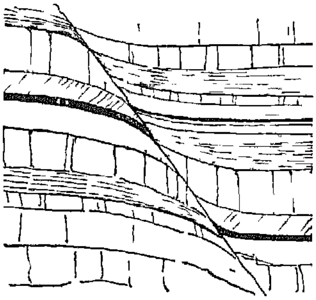
In many sedimentary rocks, the position of the originally horizontal strata has been altered by earth-movements. Though occasionally sudden earthquakes occur, the most extensive earth-movements are so slow as to be imperceptible, and yet in course of time they greatly modify the appearance of the earth's surface. These movements are due to the fact that as the interior of the earth cools it contracts, and the shape of the already hardened shell, or crust of the earth, has to alter to suit the changed conditions within. We often see, therefore, strata tilted, folded, or even cracked across ; sometimes the beds of rock have only been gently curved (see p. 87), but at other times they have been much crumpled and contorted (see Fig. D., p. 11). Where the rocks have been fractured, the relative position of the beds on the two sides of the fracture, or 'fault,' will have generally been altered to a lesser or greater degree (see Fig. C., p. 11). Plateaus have in some cases been formed by the gradual elevation of a considerable tract of land or depression of surrounding land-masses, and ranges and valleys by the upfolding and downfolding of portions of the earth's crust. (For questions, see p. 15.)



A.—Cave formed by Sea Erosion in Horizontal Strata of Chalk near Flamborough Head



B.—Fossil of Fern in a Carboniferous Rock



C.—Diagram of a Fault where the Strata on each Side have been bent along the Plane of the Fault, and on One Side depressed, and on the other dragged upwards by the strain

D.—View of a Cliff on Holyhead Island, showing Tilting and Crumpling of Rocks. Broad Bands of Quartz alternate with Thinner Bands of Quartzo Schist.

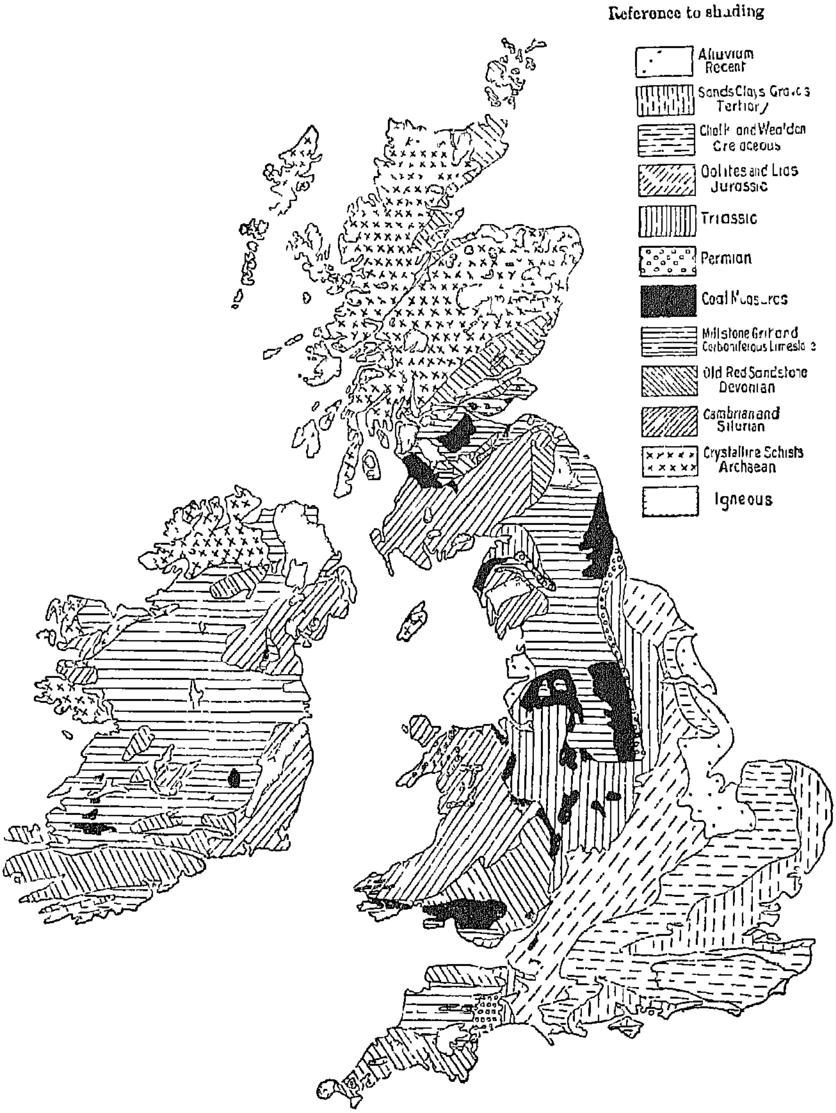
THE SCULPTURING OF THE LAND.

The forces which act from within the earth, although very powerful, are not, however, so important in determining the present aspect of the land as the external agencies of temperature, water, wind, and ice, together with the force of gravity, which tends to make everything descend to the lowest level. Heat causes rock to expand, while cold causes it to contract, and these changes promote the formation of cracks, which may be widened by the action of water or frost. Fragments will in time break off, and these will be rubbed against each other, and against the solid rock, by the wind, or in process of rolling down a slope. They will by these means grind off other rock particles, and become smaller in size themselves.

Ice destroys land by grinding the rocks over which it moves, and the great glaciers which long ago passed over the northern and western parts of the British Isles have left traces of their work in the rounded and polished nature of the rocks that lay in their paths, as well as in the huge blocks of stone, called 'boulders,' which rolled down on their moving surfaces and were transported, till the ice melted and they were necessarily dropped.

Water is, however, the most common and destructive of all the external forces. It acts on the surface of the land in the form of rain and rivers, while the sea attacks the coasts, so that certain parts of the earth's crust are being constantly dissolved or washed away, while others remain, and form ranges and promontories. The igneous, metamorphic, and older sedimentary rocks, which are relatively hard, occur in the north-west parts of Great Britain, and form the most mountainous districts in the country. Water always contains carbonic acid gas and various impurities, which act chemically on some kinds of rock and dissolve them, but the chief way in which it destroys the land is by washing stones and rock-particles into the rivers, the motion of which causes them to tear away the banks, and to grind against each other till they reach the sea in the form of mud and sand.

A river in its course to the sea generally passes through three fairly well-defined stages. In its upper course it is a mountain torrent, forming waterfalls over the harder ledges of rock and pools in the hollows. Since it flows very rapidly at this stage, it has great destructive force and carrying power. In its middle course through the valley, it will have


Reference to shading
Alluvium Recent
Sands Clays Gravels Tertiary
Chalk and Wealden Cretaceous
Oolites and Lias Jurassic
Triassic
Permian
Coal Measures
Millstone Grit and Carboniferous Limestone
Old Red Sandstone Devonian
Cambrian and Silurian
Crystalline Schists Archaean
Igneous

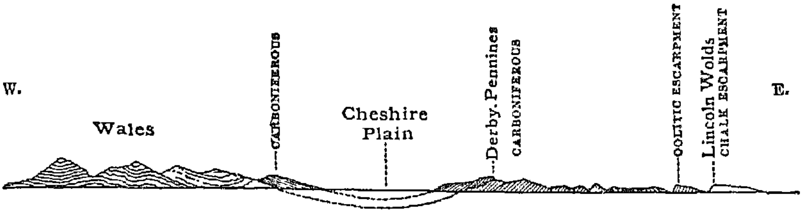
GEOLOGICAL MAP OF THE BRITISH ISLES. (After Bartholomew.)

a more regular flow, since it will have 'eroded' or eaten away the harder ledges in its bed, and filled up the hollows with silt. The stones it sweeps along will probably by this time have become broken into smaller pieces and rounded into pebbles. In its last stage across the flat plain the river has a slow, indefinite course, and 'meanders' or winds, seeking the path of least resistance, till it finally enters the sea, often through a delta it has formed by depositing silt, where its flow is partially checked through conflict with the sea. The silt deposited from river or other water forms what is called 'alluvial' soil, and this is often very fertile, as it consists of a great variety of rock-particles all ground small together (see p. 75 for a view of a meander of the Wye).

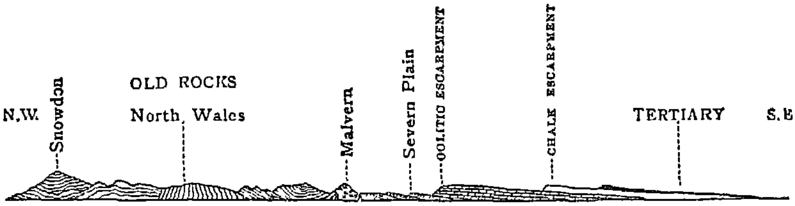
The sea destroys the coast, largely with the aid of the stones that it dashes against it, while these in the process are rounded into pebbles or pounded into sand or mud. Since the softer layers of rock and those within easy reach of the waves will be most easily destroyed, cliffs are liable to be under-cut, and caves and arches are formed, till some day a landslip occurs, and part of the coast falls into the sea (see pictures on pp. 11, 17, 39, and 59). In some places the sea is depositing material, and thus forming shingle promontories, or filling up bays, but, on the whole, the sea and rivers destroy far more than they create; in fact, if upheaval does not occur the British Isles will in time be covered by the sea, as they have been on several occasions in the long past.

The sedimentary rocks were laid down horizontally in a given order on the original igneous rocks, and it is owing to the tilting of the whole series of rocks, and to their having undergone various degrees of erosion, that we now find such a variety at the surface. Thus, underneath the chalk of south-east England is the older oolitic limestone that we find exposed in central England, and underneath this the still older rocks, which are exposed farther to the north-west. The sedimentary rocks, in fact, have been gradually tilted towards the south-east, and the Chiltern Hills are only part of the steep north-west slope, or 'escarpment,' of the upturned edge of the chalk covering. Similarly, the Cotswold Hills are part of the escarpment of the oolitic limestone rocks, which is continued in Edge Hill, the Lincoln Heights, and North Yorkshire Moors, while the continuation of the chalk escarpment is seen in the East Anglian Heights, Lincolnshire Wolds, and Yorkshire Wolds.

Some millions of years must have been required for the formation of



SECTION ACROSS ENGLAND AND WALES. (After Ramsay.)
The dotted lines show the downfold of the carboniferous rocks below the Cheshire Plain. The Pennines were formed by an upfold of them (see p. 54.)



SECTION ACROSS ENGLAND AND WALES. (After Ramsay)

many of the rocks, for deposition is a slow process, and the beds of rock are in some cases several thousand feet in thickness. Long intervals must also have occurred between the formation of one bed of rock and the deposition of another, during which land was elevated, altered, and then depressed or worn down to sea-level. It is, therefore, no wonder that the fossils of plants and animals found in the older sedimentary rocks differ very greatly from those at present existing.

QUESTIONS AND SUGGESTIONS.

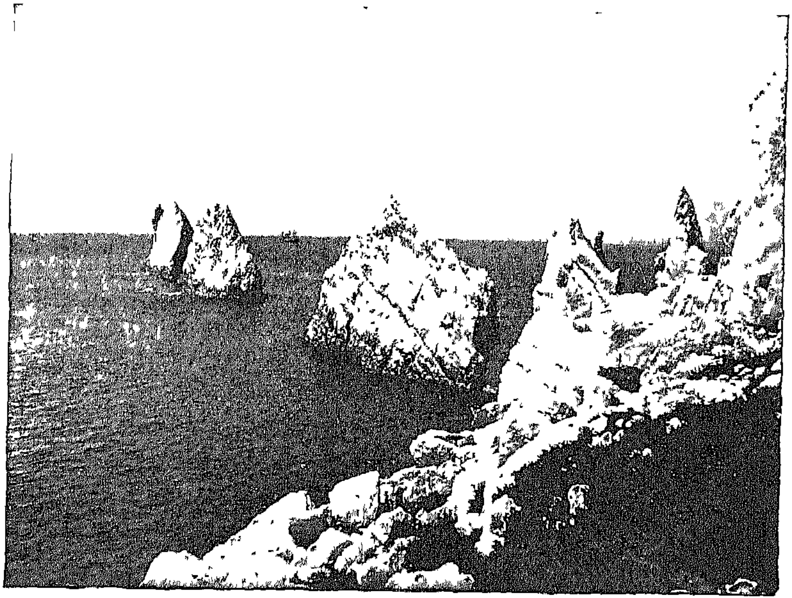
1. Get specimens of granite, marble, slate, sandstone, limestone, and chalk, and describe them.
2. What rocks occur in the district where you live ?
3. Try and obtain some fossils, and study them.
4. What are the advantages of a country possessing a great variety of rocks ?
5. Look at the geological map of England, and state where (*a*) old red sandstone occurs, (*b*) carboniferous rocks occur.
6. Explain Tennyson's lines, beginning 'There rolls the deep where grew the tree' ('In Memoriam,' verse cxxiii.).
7. Compare the above sections carefully with a map showing the relief of Great Britain and with the Geological Map on p. 13.

MINERALS AND METALS OF USE TO MANKIND.

Many rocks are used for building purposes, and since the older and harder rocks lie towards the north-west, stone houses and walls are more common there than in Central and South-East England, where bricks, made from clay, are the chief building material, and hedges take the place of walls to separate fields. The most valuable ornamental stones are marble and granite. Marble is found in Derbyshire, and in Connemara and other parts of Ireland. Granite is quarried in Ireland, Cumberland, in the Cornish peninsula, and largely in Scotland, near Aberdeen and Peterhead. Sandstone and limestone are common building materials, while slate is quarried largely in North Wales and in various parts of Scotland and Cumberland (see p. 103).

Coal, which is used for fuel and to produce steam-power, is the most important mineral to us at the present time. Though we call it a mineral it is really composed of decayed vegetable matter, hardened by pressure long ago, and fossils of plants are often found in it. Great Britain is rich in coal, but there is very little in Ireland. We are not only able to supply our own needs, but to export a large quantity, and as several of the coal-fields are near the sea exporting is easy. The South Wales coal-field exports by far the most, and is also famous for the hard, smokeless 'steam' coal, which is used by the navy. A great deal of coal is used locally to support various industries, and much is sent to London, which has none in the immediate vicinity. The chief coal-fields in order of production in 1915 were (1) the Yorkshire, Derby, and Nottingham, (2) South Wales and Monmouthshire, (3) Northumberland and Durham, (4) Scottish, (5) South Lancashire, (6) North Staffordshire. There are also small fields in the Midlands, Cumberland, North Wales, near Bristol, in Gloucestershire, and in Ireland.

Iron is the most useful of metals, and occurs abundantly in this country. Iron ore has to be smelted in furnaces in order to extract the pure iron, and, therefore, it is an advantage that coal and iron are found fairly near together in many places. Limestone is often used as what is called a 'flux' to facilitate the smelting of the ore, and this, too, is generally found near the iron. Nearly two-thirds of the value of all the iron ore mined yearly in this country are obtained in the Cleveland district of North Yorkshire, in parts of South-West Cumberland, and in North Lancashire around Barrow. Other important deposits occur in the Scottish plain and in North Staffordshire, but those that remain around



[*Photochrom Co., Ltd.*

THE NEEDLES, ISLE OF WIGHT.

These isolated chalk stacks are due to the action of the sea in eroding away the rocks originally in between (see pp. 14 and 59).

Birmingham and in South Wales are not considered at present to be worth working comparatively, so that iron industries in these localities are practically dependent on iron imported from other districts or from foreign countries. Steel is iron which has undergone a process by which it is combined with a small amount of carbon.

Other metals found in Britain are tin, obtained in Cornwall and Devon, and a little zinc in Wales. The copper mines of the Cornish peninsula, once so important, are now practically exhausted. The mineral salt is mainly found in Cheshire, Worcestershire, and Durham.

QUESTIONS AND SUGGESTIONS.

1. Compare the advantages of wind, water, and coal as sources of mechanical power. How has electricity, as a means of conveying power, enhanced the value of waterfalls?
2. Fill into a blank outline map of the British Isles the chief coal-fields and iron deposits.
3. What metals or minerals have we to import because they are not found in the country, or not found in sufficient quantities for our requirements?

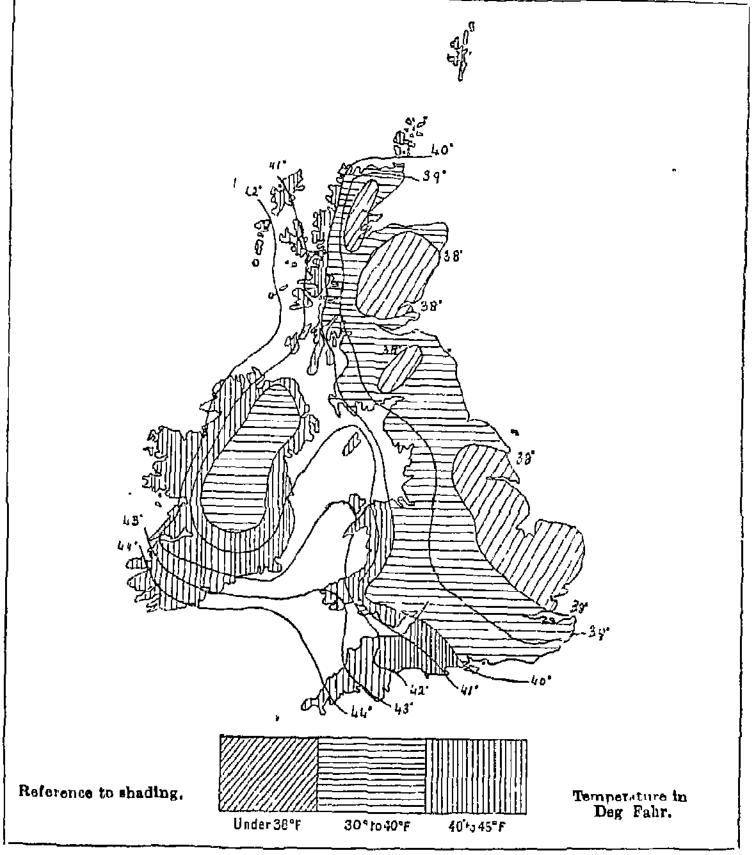
CLIMATE: TEMPERATURE.

By the climate of a country we mean the average weather throughout a series of years; the discussion of climate requires us therefore to consider questions of temperature, winds, and rainfall. We ascertain the temperature of the air by means of a thermometer, and, in Britain, generally use Fahrenheit's, on which freezing-point is marked at 32° and boiling-point at 212°.

Although the interior of the earth is very hot, it is from the sun that the surface of the world derives its heat, and the amount of heat received at any place will largely depend on the angle at which the sun's rays reach it. When the rays fall perpendicularly on a district, they have a smaller area to warm, and are therefore more powerful than when they strike it aslant. This is one reason why districts near the equator are hotter than those near the poles, or, in other words, why temperature varies with latitude. It also explains why southern slopes in the northern hemisphere, and northern slopes in the southern hemisphere, are comparatively warm.

Another reason why vertical are more powerful than slanting rays of heat is that they have a smaller amount of the atmosphere to pass through, and so lose less heat in their passage from the sun to the earth, because the atmosphere absorbs some proportion of the heat, especially if it is damp or laden with dust particles. We must remember, however, that if the atmosphere prevents much of the sun's heat from reaching the earth it also prevents the earth from parting with the heat it has received as quickly as it otherwise would. Tracts of high ground and mountain-tops are relatively cold, partly because there is less atmosphere over them, and so the heat received is quickly lost, but also because there is less land-surface to be warmed. The air, in fact, receives most of its heat indirectly from the land, and not directly from the sun, so the upper layers of the atmosphere are always cold. In the maps on pp. 19 and 21 the differences of temperature due to altitude are ignored, and the temperatures are calculated for sea-level; but since we know temperature falls about 1° F. for 270 feet of ascent, where the ascent is steep and the elevated area is of small extent, it is possible to find out roughly what this difference amounts to where the height is known.

The temperature of a place varies according to the season. Owing to the earth's motion round the sun, and to the inclination of its axis, ISOTHERMS FOR JANUARY. (After Buchan.)



the sun's rays fall more nearly vertically on us in summer than in winter, and the days are longer and the temperature higher.

Temperature will vary also according to the nature of the surface on which the sun's rays fall. Land, especially bare rock and dry soil, receives heat far more quickly than water, and also loses heat more rapidly. A large body of water, therefore, has a more equable temperature than land, and tends to moderate the extremes of temperature in the atmosphere over it. It will thus indirectly affect the temperature of land in its vicinity, and the comparatively small difference between our winter and summer temperatures is largely due to our country being surrounded by sea. Another factor influencing the temperature of a place is the direction of the prevailing winds which blow over it (see p. 21).

QUESTIONS AND SUGGESTIONS.

1. Find out daily what is the temperature of your schoolroom, and what it is out of doors, and keep a record of the results.
2. Look at the maps on pages 19 and 21 showing isotherms, or lines drawn through places having the same mean temperature for the same period. What is the average temperature in July of South England, and what of North Scotland? What is roughly the decrease of temperature for one degree of latitude?
3. Ben Nevis is 4,400 feet high. When the temperature at sea-level is 45° F., what might we roughly expect to find it at the top, and would there probably be snow there?
4. Contrast the range of temperature in the north-west and south-east of Great Britain. Why do we use the expression a 'continental' type of climate to mean one of great extremes of heat and cold at different seasons?

CLIMATE: WINDS.

Winds are caused by the unequal temperature of various parts of the world. The total volume of the atmosphere normally exerts a pressure equal to 15 pounds on every square inch, but air over heated surfaces tends to expand and so to lessen the volume and pressure of the atmosphere over such areas, whilst over cold surfaces it contracts and therefore increases them. Hence atmospheric pressure varies at different places and at different times. Air tends to equalize pressure by moving from areas where pressure is high or great to those where it is low or relatively small, and air in motion is called a 'wind.'*

For various reasons the normal belts of high atmospheric pressure round the world are situated in latitudes somewhat higher than the tropics of Cancer and Capricorn. Winds do not blow directly northwards and southwards from these areas of high pressure to the areas of lower pressure, which are near the equator and the Arctic and Antarctic circles, but, largely on account of the rotation of the earth, they blow spirally outwards from high-pressure areas, and inwards towards low-pressure areas. The winds are in fact deflected to the right of their direction of motion in the northern hemisphere, and to the left in the southern.

We find, therefore, that north-east and south-east winds prevail north and south respectively of the equatorial belt of low pressure, and these are called 'trade winds.' South of the belt of high pressure about the Tropic of Capricorn, the winds are north-west, or nearly due west, while north of the high-pressure belt about the Tropic of Cancer the

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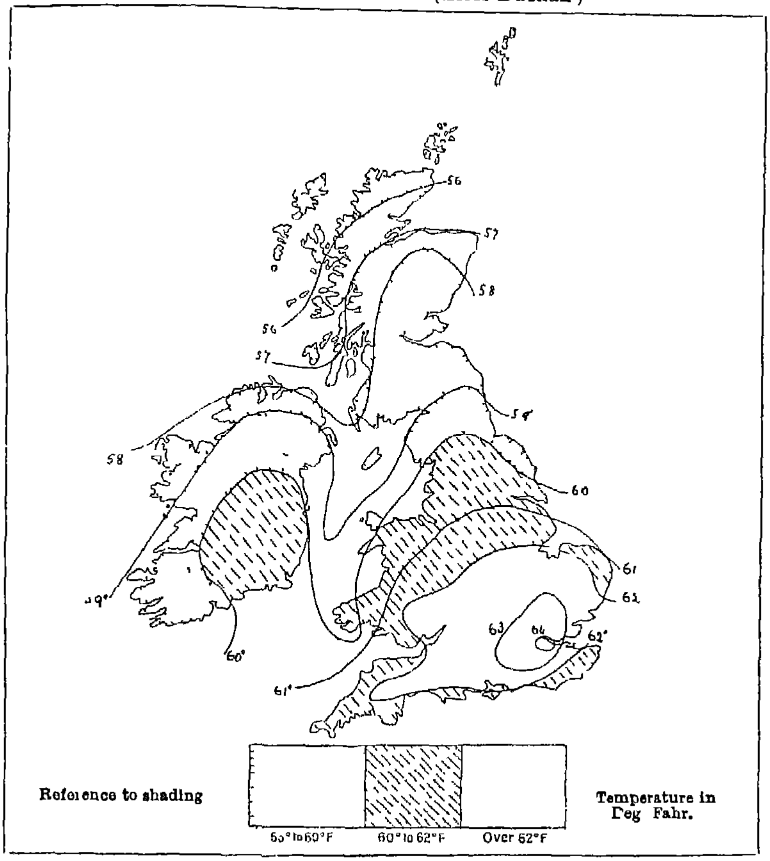
* The pressure of the atmosphere is measured by means of the barometer, and is normally sufficient to support a column of mercury 30 inches high. When the pressure is less the mercury in the glass tube of the barometer falls, and when the pressure is greater it rises.

Isotherms for July. (After Buchan)



winds are frequently south-west or west Two days out of every three on an average the wind in this country is westerly or south-westerly.

These winds render our climate much warmer than it would otherwise be in winter, when they pass over water that is naturally at that season warmer than land. They also blow the warm surface-water of equatorial regions in a north-easterly direction, and so create the North Atlantic Drift, which, by helping the winds to retain their temperature, indirectly influences the climate of North-West Europe. The difference between the temperature of places on the same latitude on the west and east of the Atlantic is mainly due to differences in the directions of the prevalent winds.

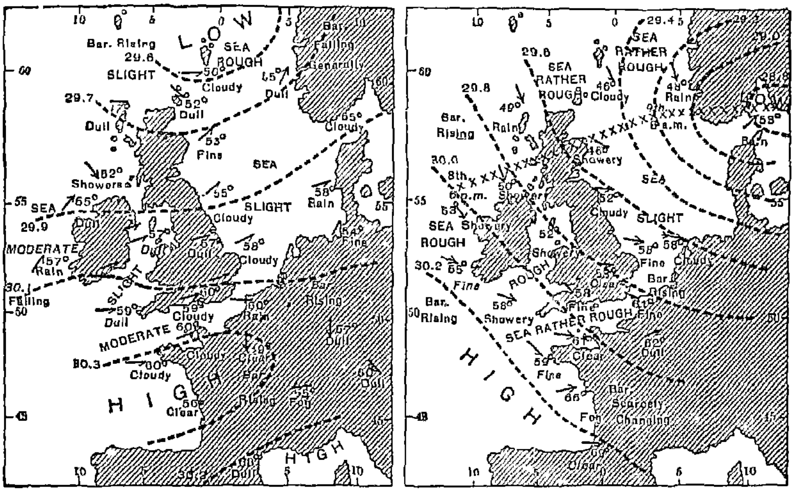
The temperature of Quebec in January is 14° F What is it at London, which is a little further north, at the same time?

CLIMATE: RAINFALL.

Rain is due to vapour in the atmosphere being changed or 'condensed' into some visible form, such as clouds, and finally still further condensed into water, which falls as rain, or as hail and snow if it is very cold. There is vapour in the atmosphere because water is always being changed into it or 'evaporated,' and this process goes on most quickly when the air is hot and is over a large mass of water like the ocean. The south-west winds often bring us rain because, in passing over the warm ocean, they have received a good deal of moisture through evaporation. On the other hand, east winds are generally dry in this country because they have chiefly passed over land, and, being relatively cold, can hold less moisture than warmer winds.

Moisture in the air tends to collect round particles of salt and dust, which chill it sufficiently to make it visible in the form of fogs, and these are therefore peculiarly common at the seaside and in large towns. There are many ways in which moisture in the air may be chilled and so condensed into clouds and rain. Winds, for example, may carry it from warmer to colder latitudes, as the south-west wind does in the northern hemisphere, or they may bring it into contact with the upper and therefore colder layers of the atmosphere. The expansion consequent on any upward movement into a layer where the air is naturally less dense is probably the most important cause of the cooling of air. Mountain ranges, therefore, exercise great influence on the rainfall of a country, because by intercepting the course of winds they force them to ascend. As this upward movement will be continued backwards for some distance from the front of the range, the moisture in the air may be condensed and fall as rain not only on its slopes, but for some distance before it. When the moisture carried by a wind has fallen as rain, the wind naturally passes on in a dry condition until it has an opportunity of evaporating more moisture, or until some greater chill condense whatever moisture it may still retain. This is why the rainfall of our country is heaviest in the west, where there are the highest tracts of land in the path of the westerly moisture-laden winds.

The storms, which are particularly frequent in autumn and winter, and mainly affect our north-west coasts, are generally of a cyclonic description. They are caused by an area of marked low pressure passing over the northern part of the country in the track of the usual south-west winds. Air from all sides will blow spirally in towards this atmo-



WEATHER CHART TUESDAY, SEPT. 8, 8 A.M., 1903. WEATHER CHART, WEDNESDAY, SEPT. 9, 6 P.M. 1903.

These charts are reproduced by kind permission from the *Times*. The amounts of barometric pressure are stated at the end of the isobars; the other figures indicate temperature or latitude and longitude. The crossed line in the chart for Sept. 9 shows the apparent movement of the centre of the depression. Light wind —➝; strong →; a violent gale ⋙—⋙

spheric depression, and strong winds will be formed, which will shift as the centre of the depression moves on. The inblowing winds will have their directions much deflected to the right, on account of the earth's rotation, so that normally they will only cross the 'isobars,' or lines drawn through places having the same amount of pressure at the same time, at a slight angle. The configuration of the land crossed by the winds and other circumstances may, however, also affect the degree of deflection. Look at the map above for Sept. 9, where the pressure, as measured by the barometer, decreased from 30·2 inches in the south-west to 28·8 in the north-east, and notice the direction of the winds. As the air rushes into the area of low pressure it expands, and therefore cools, so that rain is likely to fall. In fact, whenever the barometer falls, and thus indicates a decrease of pressure, we consider it to be a sign of coming rain. Since air in the centre of a cyclone is probably constantly rising and flowing out far above the surface of the earth the area of low pressure in the middle may be maintained for some time, but as the cyclonic system travels onward it generally undergoes considerable modifications, and eventually vanishes. An anticyclone is the converse of a cyclone; that is, the area of highest pressure is in the centre, winds will blow outwards, and the weather will probably be dry.

The yearly rainfall of a district is calculated by measuring how deep the water from rain would be if none of it soaked into the ground or evaporated. The depth of the rainfall is generally stated in inches in this country; *e.g.*, the average rainfall of London is about 24 inches, and of Seathwaite in Cumberland, one of the rainiest places in Europe, about 143. In some countries rain falls only or mainly at one season; but the amount we receive is very evenly distributed throughout the year, and thus we do not incur the dangers of severe floods and long droughts.

We see, therefore, that our climate has the following advantages: (1) It is healthy; (2) it is equable; (3) the temperature is remarkably high, considering the latitude, in winter; (4) the rainfall, well distributed throughout the year, is everywhere sufficient for vegetable growth.

We also find we can broadly distinguish the climate of the following regions of this country: (1) The highlands of the north and west are cool, equable, moist, and cloudy; (2) the lowlands of the north and west are relatively warmer, but also equable, moist, and cloudy; (3) the lowlands of south-east England, which suffer greater extremes of temperature, are drier, and enjoy more sunshine.

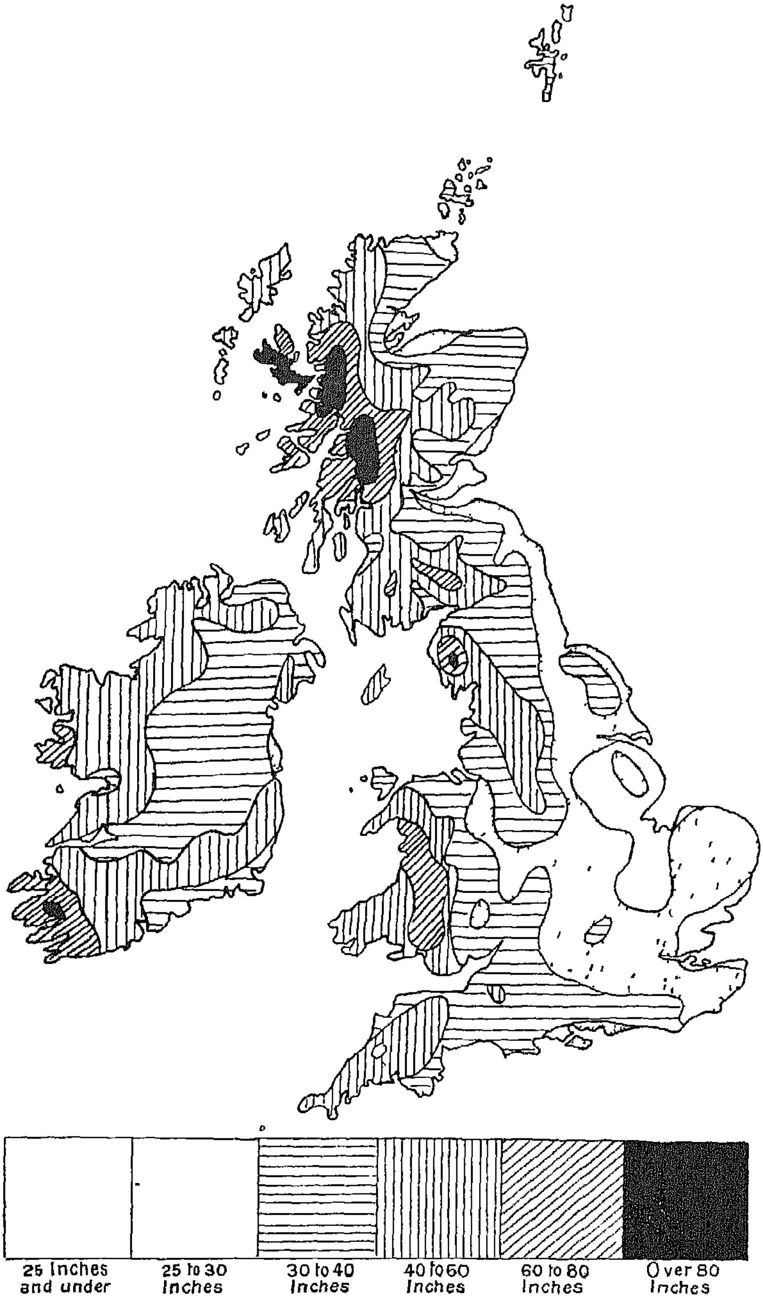
SUGGESTIONS.

1. Describe a barometer. Keep a record of the atmospheric pressure in your district.
2. Construct diagrams to illustrate the mean monthly rainfall of the following places averaged for the years 1866-1880, the figures representing inches and one decimal of an inch: state why the totals differ in the different places.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
London - - -	2·4	1·7	1·4	1·9	1·7	2·3	2·4	2·3	2·4	2·6	1·9	2·4
Cardiff - - -	4·5	3·4	2·4	2·4	2·5	2·5	2·6	2·9	3·4	3·3	2·8	3·3
Leeds - - -	2·0	1·8	1·8	1·9	1·8	2·1	2·6	2·4	3·0	2·8	2·3	2·7
Bolton (Lancashire)	4·0	3·4	3·1	2·3	2·4	3·3	4·2	4·4	5·3	5·5	4·6	4·7
Edinburgh - -	2·5	2·1	1·6	2·0	1·9	2·1	2·8	3·1	2·8	2·1	2·5	2·3
Glasgow - - -	6·1	4·2	3·1	2·7	2·4	3·0	3·4	4·1	5·0	5·0	4·3	5·3
Portree (Skye) -	10·2	7·4	5·7	4·2	3·8	4·8	5·0	5·4	7·4	9·2	8·3	9·8
Belfast - . -	3·3	2·6	2·1	2·0	2·2	2·1	3·0	3·1	3·3	3·8	3·0	3·1
Cork - - -	5·1	8·3	2·9	2·7	2·3	2·9	2·3	3·2	3·7	3·9	3·9	4·2

3. Find out what a rain-gauge is like, and how the rainfall can be measured by it.

ANNUAL RAINFALL (After Buchan)



Reference to shading.

VEGETATION.

This depends chiefly on climate, though also on soil and on the relief of the land. The last, besides influencing climate, determines the ease with which a district may be cultivated. Formerly, much of our country was covered with forests, but these have been cut down, so that we now only possess such patches as the New Forest in Hampshire, the Forest of Dean in Gloucestershire and Epping Forest (see p. 91).

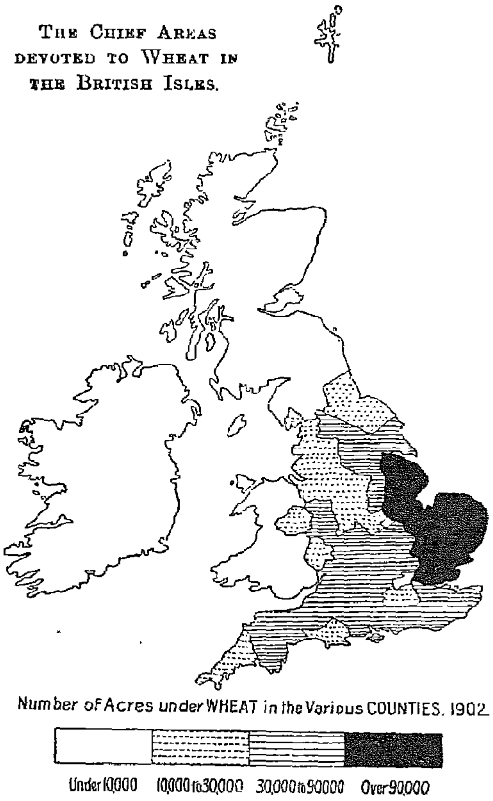
We can now broadly differentiate the following vegetation areas: (1) The highlands of the north and west, which are mainly bog, moor, or barren wastes, though in parts covered with poor grass; (2) the lowlands of the north and west, which form good pasture lands, and are suited for such crops as oats and potatoes; (3) the lowlands of south-east England, which are devoted to cereals, such as wheat and barley, to root crops, vegetables, fruit, and hops. You will see by the map opposite where we chiefly grow wheat—to the extent of about one-fifth of what we require.

ANIMALS OF USE TO MANKIND.

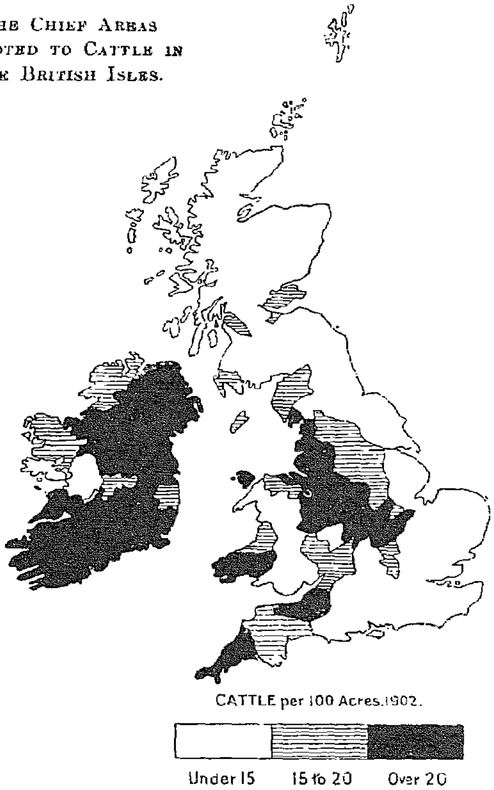
Vegetation naturally influences the distribution of animals. The districts devoted to cattle will be seen by the map to be those where a heavy rainfall creates rich pasturage. Sheep and ponies are chiefly reared on the higher regions where cultivation is difficult—on the uplands of Scotland, Wales, and Devon, and on the English hills. Horses seem to prefer the flatter, drier regions of Yorkshire and the Wash basin in England, and north of Dublin in Ireland. Pigs are very numerous in Ireland.

The sea fisheries around our shores are of high commercial value, but river fish, save salmon and trout, chiefly caught in certain Scotch and Irish rivers, are not very important. The shallow waters round the Dogger Bank in the North Sea are particularly rich in cod and in flat fish, such as plaice, sole, turbot, etc. Herring are caught all round the coast, for they migrate from the North, where they are found in summer, to the English Channel, where they appear in winter. Mackerel are also widely distributed, while pilchards are chiefly found off the Cornish peninsula, and haddock off the east coast of Scotland. Oysters are reared mainly off the coasts of Kent and Essex.

THE CHIEF AREAS DEVOTED TO WHEAT IN THE BRITISH ISLES.



THE CHIEF AREAS DEVOTED TO CATTLE IN THE BRITISH ISLES.



THE DISTRIBUTION OF POPULATION.

If you compare the map opposite with the one on p. 7 you will see that the relief of the land is one of the chief factors determining the distribution of population, for highlands are relatively cold, infertile, and difficult of access, and therefore tend to be sparsely peopled. As no part of our country is too cold, too unhealthy, or too dry for human life, the influence of climate—another great factor—is only realized when we consider other parts of the world. The regions of least population, for example, are the Polar deserts, and the dry deserts of Central Asia, North Africa, and Australia.

The discovery of the value of coal as a source of steam-power caused dense populations to gather on and near the coal-fields, in order to engage in various industries. Now, however, that electricity can be utilized for the conveyance of power, this concentration is not so necessary, and may be reduced, though only gradually, since men do not forsake a district as soon as the original inducement for their residence there is past. Many towns arose long ago for reasons which have little force under modern conditions, and yet they persist, and even flourish, because men have remained in them, and have perhaps artificially given them fresh advantages.

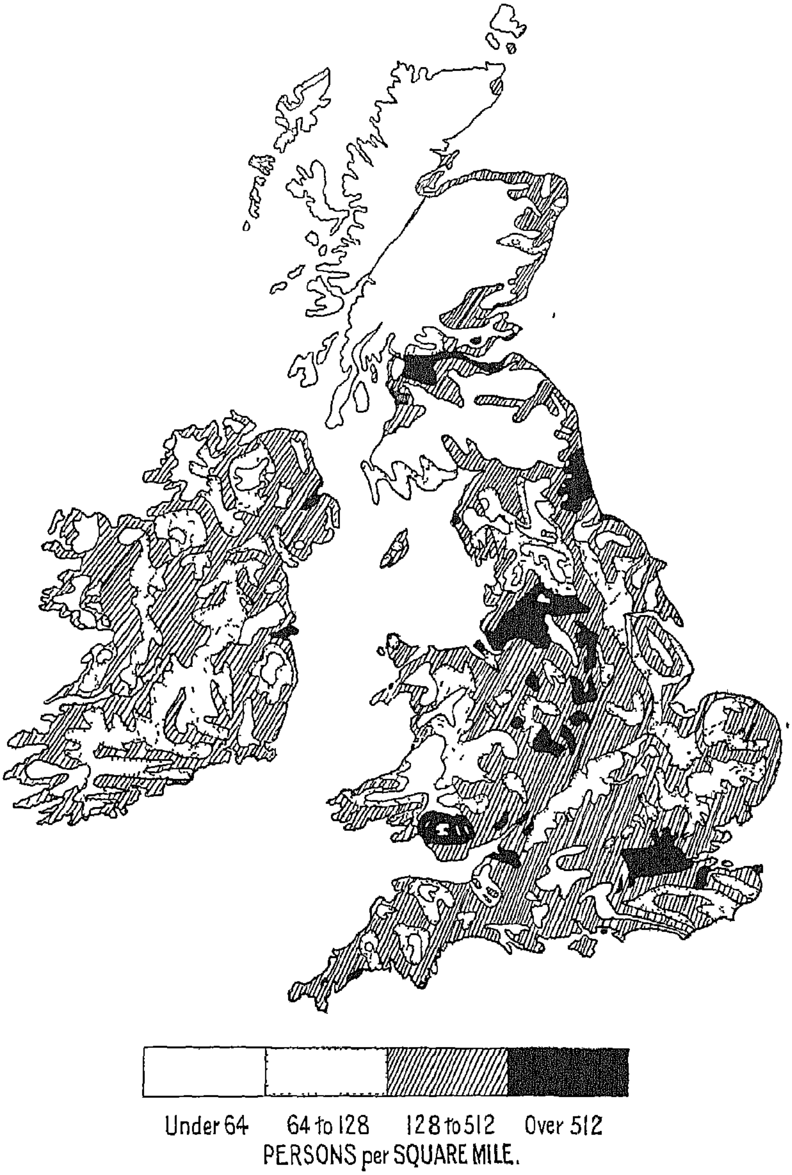
We can broadly divide the British Isles into the following areas of population: (1) The Highlands and Southern Uplands of Scotland, the Cheviots, Pennines and Cumbrian group in England, the Uplands of Wales and West Ireland; in all these population is very sparse. (2) The Lowland plain of Scotland, the coal-fields and their vicinities in England and Wales, and the London area, where population is very dense. (3) Central and Southern England, and the lowland areas in Ireland, where there is a fairly dense population pretty evenly distributed.

According to the census of 1921 the population of England is 35,678,530; of Wales, 2,206,712; and of Scotland, 4,882,288. No census was taken in Ireland, but in 1911 the population was 4,390,219. The total for the United Kingdom of forty-seven million shows an increase of two million on the census for 1911.

QUESTIONS.

1. The area of England is 50,874 square miles; of Wales, 7,466; of Scotland, 30,405; and of Ireland, 32,586. What is the density of population in each per square mile?
2. Contrast the distribution of population in Ireland and Scotland.

The Density of Population in the British Isles. (After Bartholomew)



THE GROWTH OF TOWNS.

In former days towns were often built in places which afforded natural facilities for defence, such as on hilltops, peninsulas, small islands, and districts surrounded by marshes.

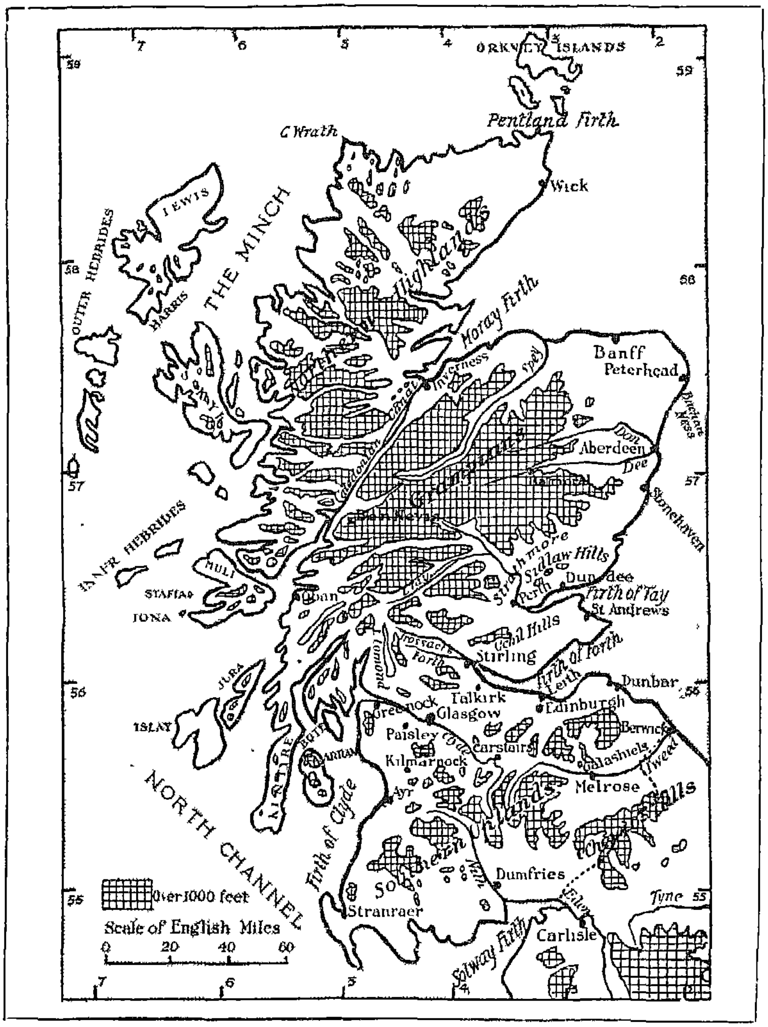
Another consideration influencing the choice of a site, and one still important, was suitability for trade. A town, for example, was likely to grow up at a point where a river was bridged, because it would receive trade from routes converging towards the bridge, as well as by the river route; or where the river receives an important tributary; or at the mouth, where ocean routes would converge towards the river, and goods often have to be conveyed from ships to boats or land vehicles. A town situated at the base of a range near a pass will, like a town at a bridge, be a centre of traffic, and also have a military value as guarding an important route.

Nowadays, owing to the ease with which railways are built, a town can be made a centre of traffic where, from its situation, it would not naturally become so, though geographical conditions have still an important influence on railway centres. Other considerations which, in various cases, have influenced the sites of towns, are a good water-supply, waterfalls which can be used as a source of power, the mineral resources of a district, salubrity, and scenery.

London is the largest city in the world, and Greater London, which covers an area within about fourteen miles of Charing Cross, has a population of seven and a half millions. Glasgow has a population of just over a million, Liverpool with Birkenhead, Manchester with Salford, and Birmingham, have each a population of nearly a million, while Sheffield, Leeds, Edinburgh, Dublin, Belfast, Bristol, Hull, Bradford in Yorkshire, Newcastle, and Nottingham range in decreasing order from about half to about a quarter of a million.

QUESTIONS.

1. Think of some castles which have been built on sites which rendered defence easy either on account of their height, or through their being partially water-girt (see views, pp. 47, and 109).
2. Can you think of any reasons which have affected the growth of the town you live in? What is its population?
3. What towns in England indicate by their names that they occur at places where rivers are bridged or could be forded?
4. What are the disadvantages of a great many persons living in a few large towns and very few inhabiting the country districts?



Relief—After the Diagram Co.

SCOTLAND.

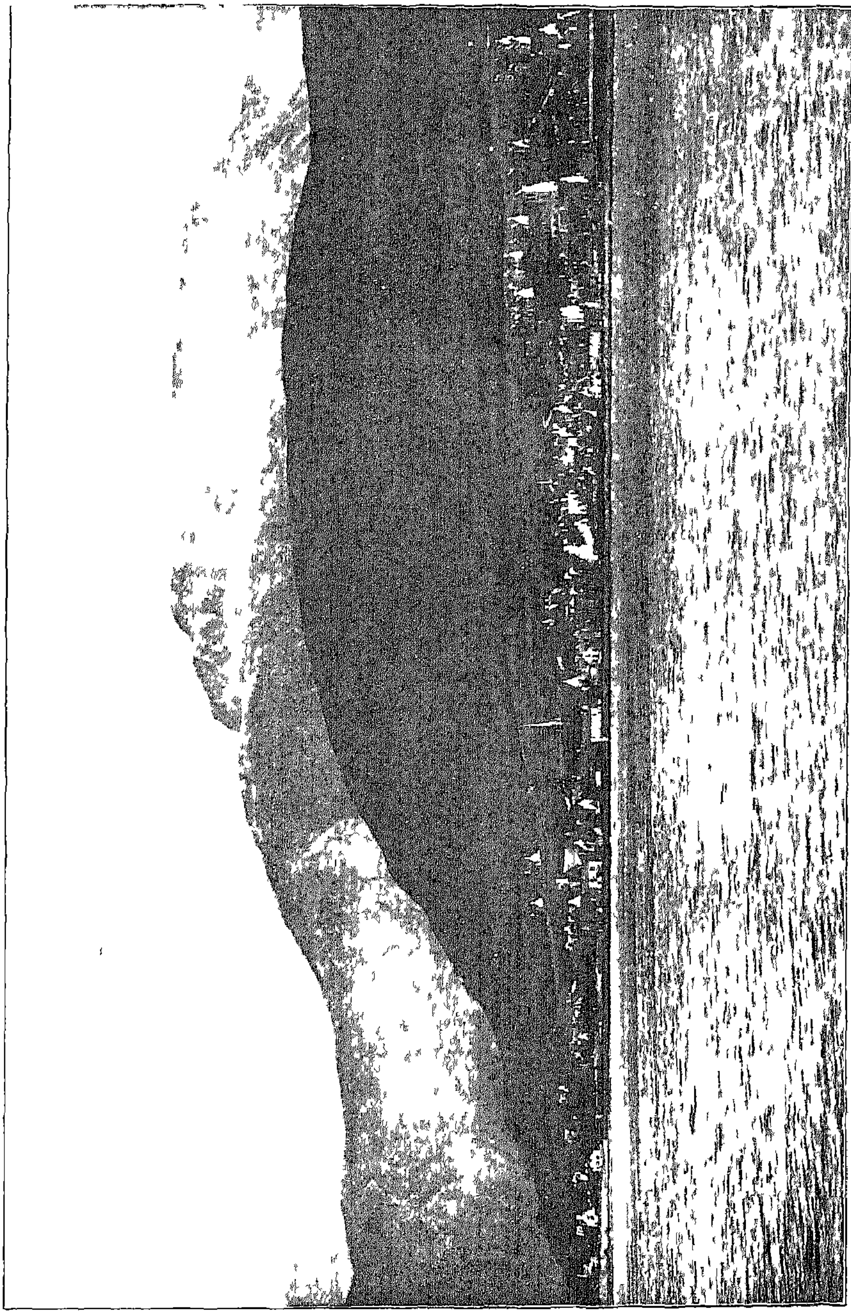
The regions into which Scotland naturally falls are the Highlands, the Lowland plain, and the Southern Uplands. Sir A. Geikie has vividly contrasted the first two in the following passages, which occur in his book on 'The Scenery of Scotland' (Chapter XIX.): 'The Scottish Highlands, sharply defined against the Lowland plains, and washed around their other sides by the stormy Atlantic Ocean, offered in rude times a wild and almost inaccessible asylum against invasion. There the original Gaelic population has been able to maintain itself, while wave after wave of hostile immigrants has broken against the bases of the hills. . . . Like his own granitic hills, he (the Highlander) has grown hard and enduring, not without a tinge of melancholy, suggestive of the sadness that lingers among his wind-swept glens, and that hangs about the birken slopes around his lonely lakes. . . . But in the formation of the national character, as in the development of the material prosperity of the country, the dominant influence has undoubtedly been that of the Lowlands There, in earliest and rudest times, lay the widest extent of fertile land to attract and retain the aboriginal settlers. . . . The open, defenceless condition of this little strip of territory exposed it to invasion, now from the wild Gaels of the Highlands, now from the devastating English armies. Again and again it was laid bare with fire and sword ; it became the battlefield on which the struggle of liberty was fought and won. Its smallness of size kept the people within touch of each other from sea to sea, and engendered, or at least nurtured, that spirit of standing shoulder to shoulder which is one of the distinctive national traits.'

THE HIGHLANDS.

This region, which has an average elevation of 1,500 feet, extends southwards to a line connecting the mouth of the Clyde and Stonehaven, where a sudden change of rock occurs. The termination of this district is so clearly defined that its front, seen from the plain, has a wall-like appearance, only broken by rivers which have cut channels through it to the Lowlands—*e.g.*, the Forth and Tay.

The rocks of the Highlands are mainly slates and limestones, all formed very long ago, and often so altered by later crushing and crumpling, due to vast subterranean disturbances, as to have assumed a hard crystalline nature, like schist, gneiss, and quartzite. They are, in fact, metamorphic (see p. 10). The igneous rock granite also occurs in places, and caps many of the higher mountains. The variety of rock-structure in the region causes a corresponding variety in the scenery, for the softer slates form rounded mountains, generally covered with bogs, while the harder masses of quartz tower up into lofty peaks, and the gneiss weathers into serrated ridges and precipitous cliffs—*e.g.*, Cape Wrath. The eastern coastal plain, which is the most fertile, and thus most populous, district in the North of Scotland, consists mainly of old red sandstone.

Throughout Scotland there are numerous traces of the extensive ice action of the glacial age. Many of the rocks have evidently been rounded, polished, and scratched by the enormous glaciers which must have passed over them. Thick layers of clays and gravels called ' boulder-clay ' also occur in parts, which are composed of the rock-waste trans-



[Photochrom Co., Ltd

BEN NEVIS AND FORT WILLIAM.

ported by the glaciers and partly ground small by them before being deposited.

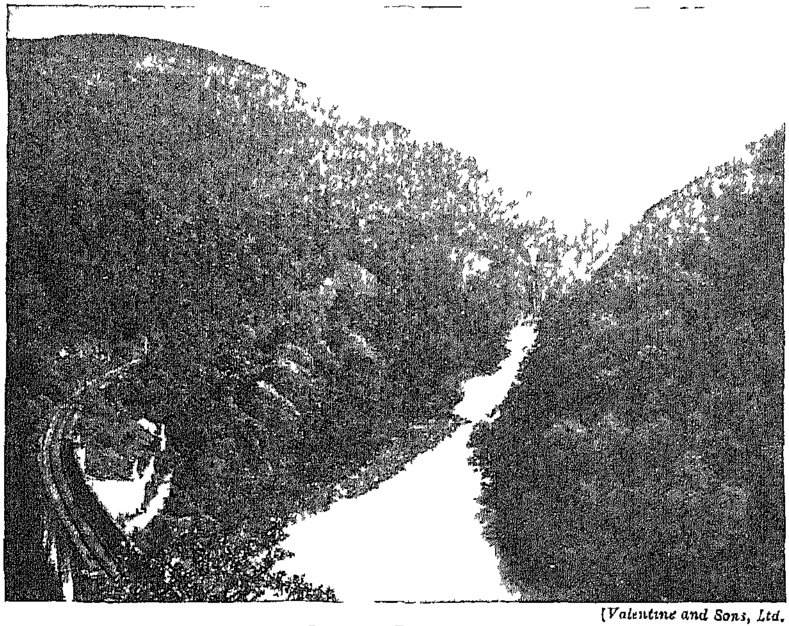
The Highlands are cut into two by the natural rift, caused long ago by great geological faults, which is called 'Glenmore,' and is now utilized by the Caledonian Canal. The water-parting of the Highlands has a general north to south direction, and lies nearer the west than the east coast. It consists of a series of ridges connecting mountainous masses or of tracts of moorland, and will be found to pass through the following: Ben More, Ben Dearg (3,500 feet), and Ben Attow (4,000 feet), and then extends southwards to Ben Lomond. Side-ridges branching off from the main water-parting separate the side valleys, and the highest mountains in the Southern Highlands occur in the belt of high country running south-west to north-east—*e.g.*, Ben Nevis (4,400 feet, the highest mountain in the United Kingdom), Ben Macdhui (4,300), and Cairngorm. The general name of Grampians is rather vaguely applied to the southern part of this belt, which forms a water-parting between the rivers flowing north-east and those with a main easterly or south-easterly course.

On account of the situation of the chief water-parting, the rivers flowing into the North Sea—*e.g.*, Nairn, Findhorn, Spey, Deveron, Don, Dee, North Esk, South Esk, and Tay—are longer, less rapid, and therefore more useful for navigation than those flowing into the Atlantic. The latter are, in fact, little more than torrents, and soon terminate in the fjord-like inlets called 'lochs,' which are such a striking feature of the western coasts—*e.g.*, Loch Broom, Loch Linnhe, Loch Long, etc. These inlets are but the drowned lower valleys of the rivers. Long ago the rivers carved out deep glens, which were probably modified later by ice-action, and then the whole region was gradually submerged, till the sea flooded the lower parts, forming lochs and channels, while the higher ridges and mountains stand up as islands and peninsulas.

The indented nature of the coast-line, by reason of which no place in Scotland is more than forty miles from the sea, and the many river valleys make communication relatively easy in certain directions—for example, between the east and west coast from Dingwall to Strome, a route now followed by a railway. Communication between valleys which have parallel directions may, however, be very difficult, especially in winter, and since the people live mainly in the valleys, this isolation has fostered the strong clan feeling of the Highlanders, and rendered them slow to change their customs. We find some speaking their native

HIGHLAND CATTLE

In the distance the hills of Skye and the Kyles of Loch Alsh



[Valentine and Sons, Ltd.

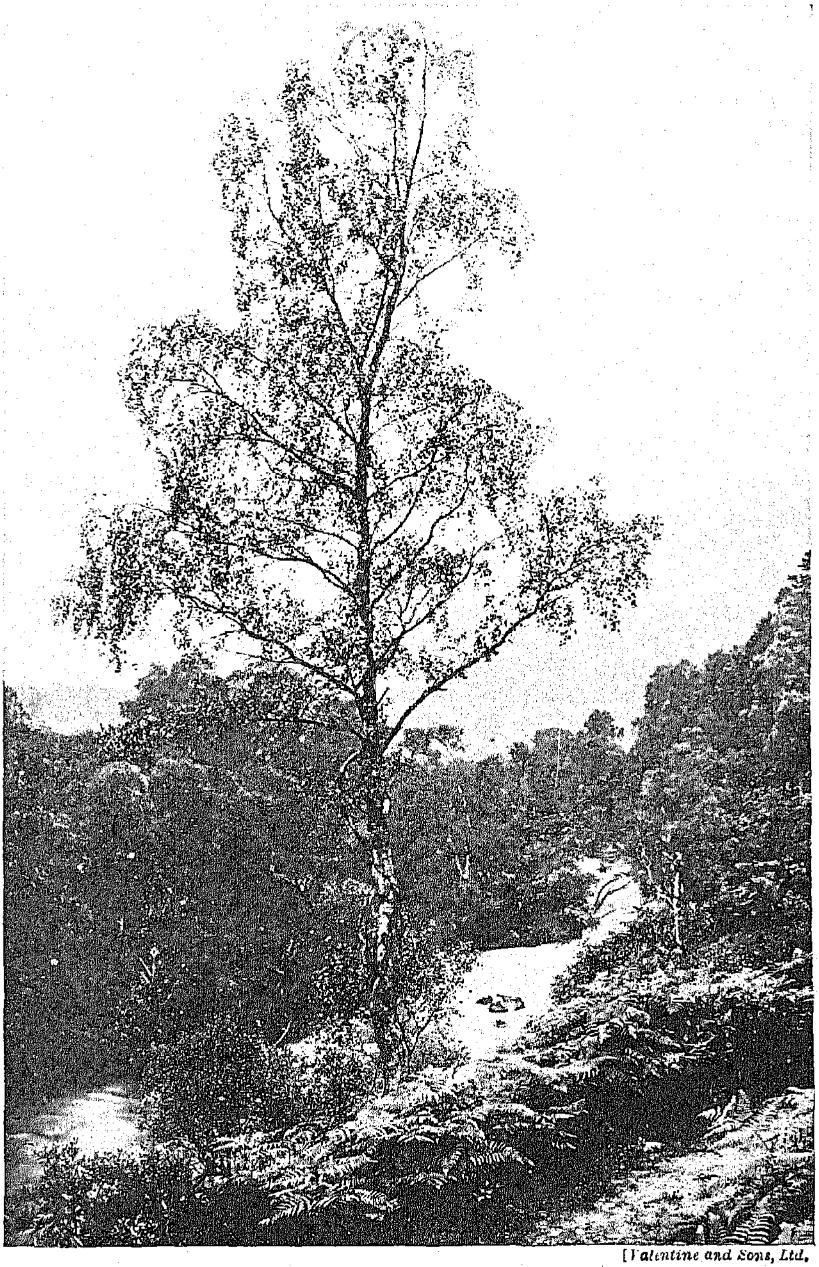
THE PASS OF KILLIECRANKIE.

Gaelic language and a few wearing a peculiar dress. There are some passes which connect important routes, notably that of Drumochter (1,500 feet high), which joins the route by the Garry tributary of the Tay with that of the Spey, and is utilized by the Highland railway. The Caledonian and Great Northern Railways of Scotland take advantage of the east coast plain.

On account of the cold, damp climate of the Highlands and poor soil, it is difficult to raise even such hardy crops as potatoes and oats in the comparatively sheltered valleys, and the population is therefore scanty. Long ago a large part of this region was forested, but now trees are rarely seen outside the valleys, and the so-called 'deer-forests' are wide expanses of barren moorlands, where the red deer still runs wild. A large part of this region has been purchased by rich men as preserves for grouse and other game. These flat-topped moors are covered with peat-moss, bracken, heather, and shattered stones. They owe their charm largely to the bracing air and changing atmospheric effects of mist and sunshine, to the miles and miles of continuous purple heather in summer, and to the mountain torrents dyed brown by peat, but flecked with white foam as they tumble over the boulders in their course.

The numberless lakes, which, like the sea-inlets, are called 'lochs,' also add to the picturesqueness of the country. Many of them look like expansions of rivers, and are long and narrow in shape. Among the largest are Lochs Shin, Maree, Ness, Awe, Lomond, and Tay. Loch Katrine, though comparatively small, is noted for its beautiful surroundings. This district is called the Trossachs, and unites the grandeur of mountain crags with the woodland beauty of gray birches, green oak copses, and a luxuriant undergrowth of ferns, mosses, and flowers.

The Highland peasants, called crofters, mostly live in scattered cottages built of stone and thatched with heather, bracken, or straw, sometimes tied on with stone-weighted ropes. A few of these houses have no chimneys, and the blue smoke from the dried bog, called peat, which is the common fuel, has to find its way out as best it can through the thatch, door, or window. The men cultivate small patches of oats and potatoes, and look after the herds of sheep which feed on the coarse grass of the moors. Dogs have been trained to be of great use to them in collecting their flocks. Ponies are also reared, and the wild-looking breed of Highland cattle with long horns and shaggy coats. Salmon and trout are



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A Glen in the Trossachs.

The silver birch flourishes well in other parts of Northern Europe as well as in these Scotch glens, where it is such a characteristic and picturesque feature.

caught in most of the rivers, and the sea fisheries are very important. Villages are few and far between, and the little towns are tourist centres, or fishing-stations and ports round the coast.

QUESTIONS AND SUGGESTIONS.

1. Describe and contrast the east and west coasts of Scotland.
2. Where is the Pass of Glencoe, and what historical events are connected with it?
3. Read Sir Walter Scott's description of the Trossachs in 'The Lady of the Lake' (Canto I., stanzas 11-14).
4. Get a blank outline map of Scotland, shade the mountainous areas, and fill in the Highland rivers.

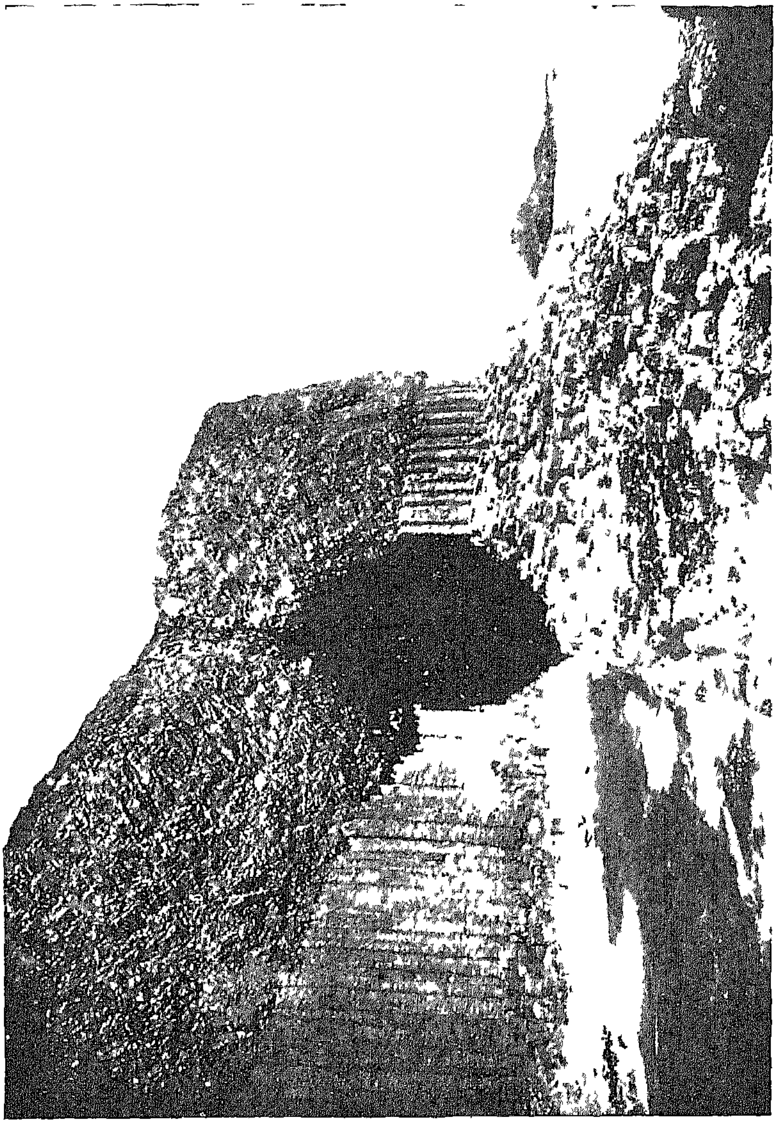
THE NORTHERN HIGHLAND COUNTIES.

Sutherland and Ross with Cromarty consist mainly of barren moorland, but their capitals, Dornoch and Dingwall, are situated on the east coastal plain of old red sandstone, which expands northwards over the whole of Caithness, and renders that county sufficiently fertile to grow good crops of turnips and potatoes. The red sandstone forms fine cliffs at Duncansby Head, and is quarried at Thurso, as it makes excellent flagstones. Wick is a fishing-station, and the county town of Caithness.

THE NORTHERN ISLANDS.

The *Orkneys* consist of old red sandstone like Caithness, from which they are separated by the Pentland Firth. The fierce action of storms and of the rapid tidal currents through this channel have wrought havoc with the coasts. On the west of Hoy the cliffs are perpendicular, and even overhang in parts, while where the softer layers in the vertically 'jointed' or cracked rocks have given way, isolated rock-pillars called 'stacks' have been formed. One stack, called the 'Old Man of Hoy,' is 600 feet high. Most of the islands are low and scantily populated. Stromness is the chief port. Kirkwall, the capital, possesses a fine ruined cathedral.

The *Shetland Islands* lie north of the Orkneys, and consist of crystalline rocks like the Highlands. 'Wall-like cliffs, over 1,000 feet high, the abode of thousands of sea-birds; tiny islets, whose verdant table-tops give pasture to a few sheep; tall peaks of bare rock cleaving the skies; narrow inlets where herds of seals may be seen sunning themselves on the sea-



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FINGAL'S CAVE, STAFFA.

Notice the columnar structure of the basalt, and compare it with the view of the Giant's Causeway (p. 125).

weed-covered rocks, here and there a stony beach piled with heaps of cod in process of curing—these are some of the scenes around the Shetland coast.' Shetland ponies and the soft wool of the sheep have become very famous. Lerwick is the centre of the fishing industry. The total population of both these groups of islands is slightly over 50,000.

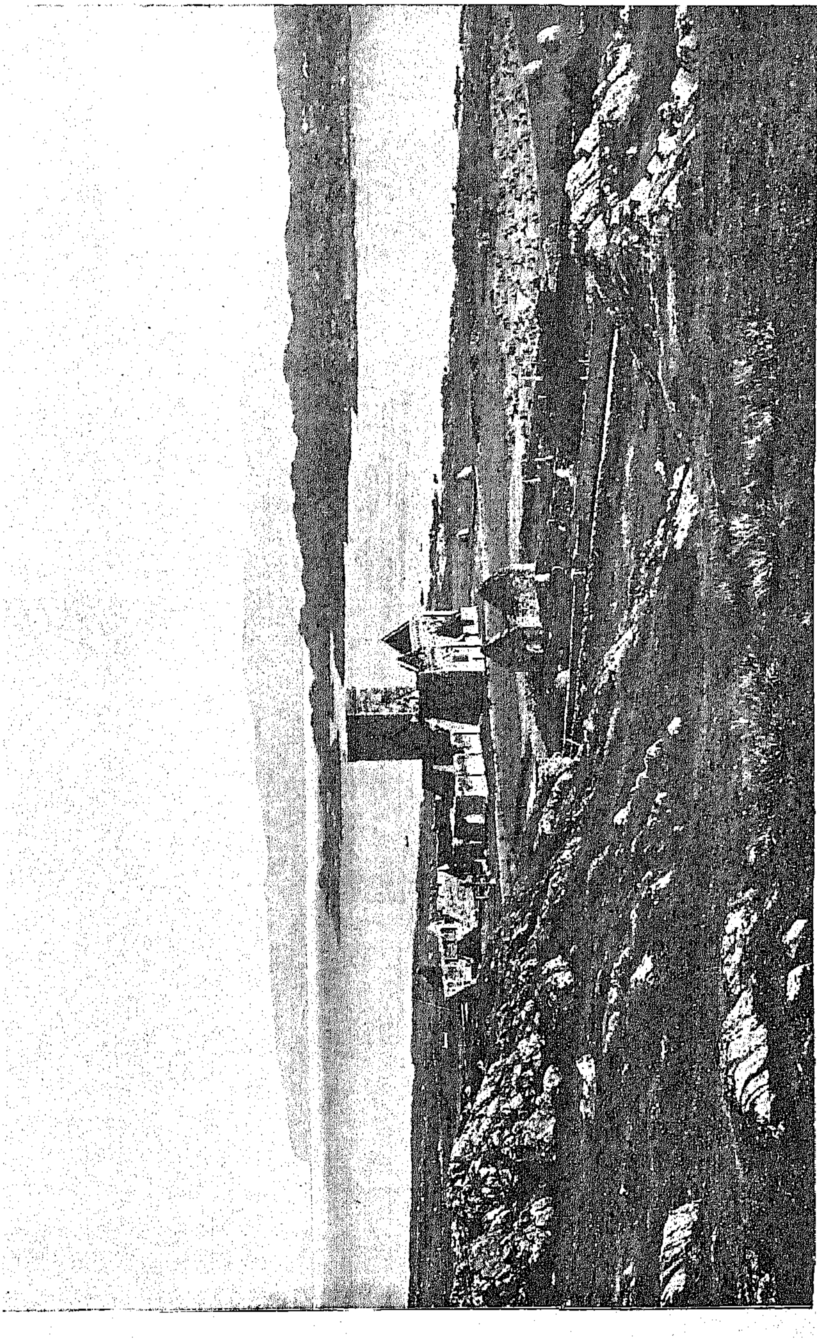
THE WESTERN ISLANDS AND SHORES OF THE MAINLAND.

The *Outer Hebrides* are separated from Skye and the mainland by the Minch and Little Minch, and consist of one large island, called Lewis in the north and Harris in the south, and several smaller islands. Although the rocks are very old they have been worn down till most of the land is under 500 feet. Much of the surface consists of rounded bosses of bare rock and numerous little lakes, but in Lewis the rock is largely covered with bog and moor.

These islands form a sort of natural breakwater, and the enclosed sea is rich in fish, Stornoway being a great centre of the herring fishing They are also the abode of many wildfowl.

The Inner Hebrides.—A large part of the two chief islands of this group—Skye and Mull—and some of the smaller islands are covered with a thick layer of basalt. This rock is of volcanic origin, and must have long ago flowed over the older rocks like lava. In cooling it has assumed the appearance of columns, and, since some layers are harder than others, it also weathers into mighty terraces. Most of the mountains are simply parts of the basalt plateau which have not been eroded, and so are flat-topped; but the dark Cuillin or Coolin Hills in Skye have sharp peaks and ridges, and are of different formation. The columnar aspect of basalt is particularly well shown in Staffa. Here the sea has eroded several caves, and one, called Fingal's Cave, is 60 feet high and 200 feet long. The walls are a continuous colonnade of natural pillars, each having six or more clear-cut sides.

Fishing, for which Portree in Skye is the chief station, is everywhere important. South of Staffa is the small island of Iona, famous for the ruins of a beautiful cathedral, built on the site of an earlier monastery founded by Saint Columba in the sixth century. Jura and Islay consist of crystalline rocks, and the 'Paps' of Jura are a group of cone-shaped mountains formed of quartz.



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Ruins of Iona Cathedral
Many of the Scottish Kings were buried here.

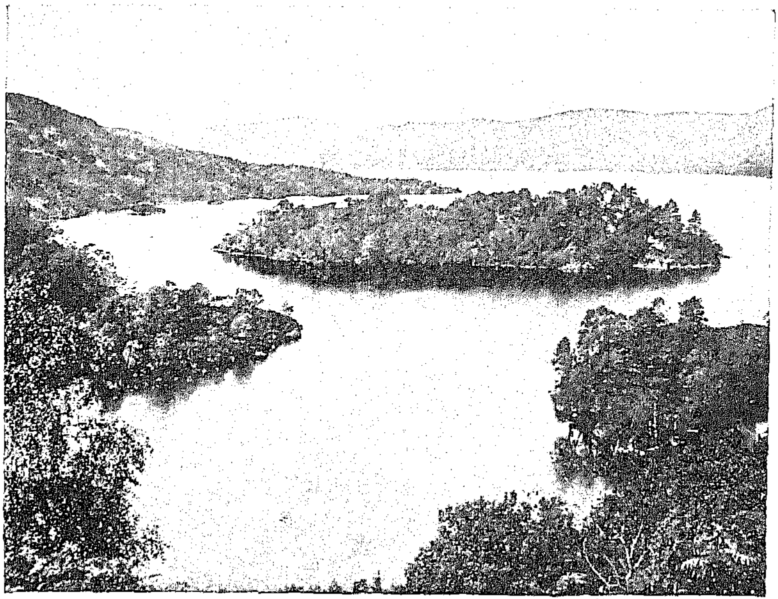
The islands of Arran and Bute lie in the Firth of Clyde, and are popular summer resorts. Goat Fell consists of granite, but other rocks occur as well in the islands, which are fairly well wooded and cultivated. Bute is separated from the mainland by the narrow picturesque straits called Kyles. Rothesay is a noted watering-place.

On the west coast the chief places are situated in the county of Argyle—*i.e.*, Inveraray, the capital ; Campbeltown, noted for its distilleries ; and Oban, a great centre for tourist traffic, since it is a railway terminus, and commands steamer routes seawards and north-westwards through the Caledonian Canal. The distance between it and Glasgow has been shortened by the cutting of the Crinan Canal across the Cantyre peninsula. Steamers go regularly in summer from it to Glasgow, Inverness, Staffa, Iona and Skye.

GLENMORE AND THE SOUTH-EASTERN HIGHLANDS.

The Caledonian Canal is guarded by Fort William, Fort Augustus, and Fort George, the last being situated at the entrance to the Moray Firth, and north of the fine old town of Inverness. Inverness is sometimes called the capital of the Highlands, and occupies a fine situation commanding the Caledonian Canal and routes northwards and westwards now followed by the railway. Near Inverness was fought the battle of Culloden Moor.

The counties of Nairn, Elgin, Banff, Aberdeen, and Kincardine consist mainly of moorland, but are bordered by a coastal plain which enlarges in the Buchan peninsula, so that the railway which passes through the towns of Nairn and Elgin is able to take a direct route to Aberdeen. Elgin is noted for its ruined cathedral, and Banff, Fraserburgh, Peterhead, Aberdeen, and Stonehaven are fishing places. Peterhead is built of red granite, quarried in the district, and Aberdeen of gray ; for between the mouth of the Spey and Stonehaven the usual schists and granites of the Highlands extend to the coast, and take the place of the old red sandstone. Aberdeen has a good situation between the mouths of the Don and the Dee. It possesses an ancient university, and, besides doing a trade in fish and granite, it exports a large number of cattle, bred in the district, and fresh beef. Balmoral Castle is a royal residence in the upper Dee valley.



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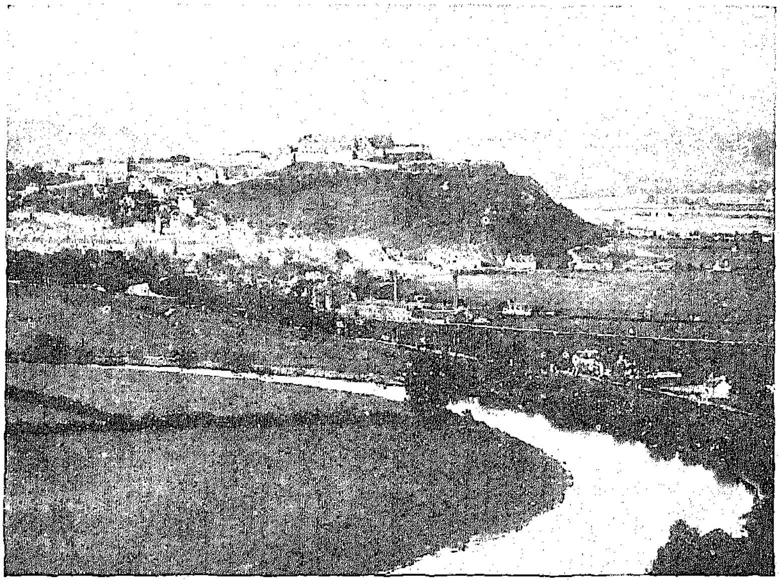
ELLEN'S ISLE IN LOCH KATRINE.



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STIRLING, TAKEN FROM ABBEY CRAIG, LOOKING SOUTH-WEST (see p. 45).
Note the good commanding situation of the castle which stands near the precipitous edge of the hill.

QUESTIONS AND SUGGESTIONS.

1. Illustrate the meaning, or meanings, attached to the following terms in Scotland: 'Sound,' 'firth,' 'mull,' 'loch,' 'ben,' 'ness,' 'butt,' 'burn,' and 'strath.'
2. Read Sir Walter Scott's description of the Hebrides in the 'Lord of the Isles' (Canto IV., *stanzas* 10-13).
3. Why are there so few ports along the west coast of Scotland north of the Clyde, though so many suitable inlets?

THE LOWLANDS: STRATHMORE.

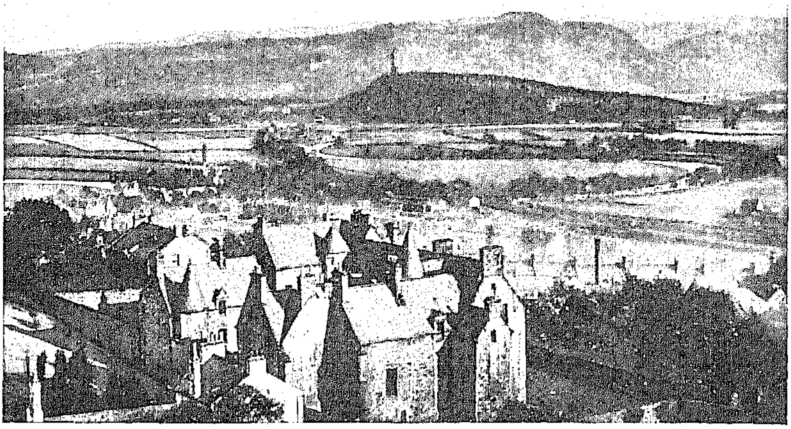
South of the crystalline rocks of the Highlands there is a diagonal belt of old red sandstone, forming that part of the Lowlands which is called 'Strathmore'—*i.e.*, the great valley. This fertile valley is bounded on the south by a belt of igneous rock which forms the hills in the north of Renfrewshire, the Campsie Fells, the Ochill Hills, and the Sidlaw Hills.

The gaps between these ranges, which are followed by the rivers Clyde, Forth, and Tay, have great strategic value, and are guarded by the towns Dumbarton, Stirling, and Perth. Dumbarton and Stirling possess castles, well situated on the tops of river-girt basaltic crags. The narrowness of Scotland between the Firths of Clyde and Tay enhanced the importance of the Forth route to the Highlands, and many battles took place at and near Stirling—*e.g.*, Bannockburn and Falkirk.

Perth is situated like Stirling at the head of navigation, and where the river could be bridged. It is an important railway junction, as it controls routes in many directions—*e.g.*, to the Highlands by the Tay, to Aberdeen and Stirling by Strathmore, to Dundee by the coast, and to Edinburgh by way of Fife and the Forth Bridge. It was once virtually the capital of the country, and the Kings were crowned near by at Scone. The purity of the water in the locality has developed the dyeing industry.

Perthshire, which is simply the basin of the Tay, falls naturally into two parts—the Highland north-west and the fertile Lowland south-east. The northern and larger part is much visited in the season by tourists and sportsmen, who stay at Crieff, Aberfeldy, Dunkeld, etc.

Forfarshire, in addition to a Highland region and part of Strathmore, embraces the Sidlaw Hills and the very fertile coastal strip called the Carse of Gowrie. Forfar is an agricultural centre, and Montrose, Arbroath, and Dundee are important as fishing-stations and for the hemp, jute, and flax textile industries. Dundee, the third largest town in Scot-



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Abbey Craig, taken from Stirling, looking North-East.

This hill, which is crowned by a monument in memory of William Wallace, consists of the same sort of igneous rock as that on which Stirling is built, but is separated from it by the flat 'carse' or plain of recent alluvium, here about a mile broad, across which winds the Forth in long loops or 'links.' The Ochill Hills, which consist of layers of ancient volcanic lavas, rise steeply in terraces behind the Craig.

land, has large manufactures of carpets and sacking made of jute from India, of ropes made of hemp from Russia, and of sailcloth and coarse linen made of flax from the Baltic countries. Coal has, however, to be imported. The fruit grown in the Carse of Gowrie originated the jam industry, to which is added the manufacture of marmalade. The town receives traffic by way of the railway bridge over the Firth of Tay as well as by the coastal routes.

SUGGESTIONS.

1. Draw a map of the Tay, marking important tributaries, lakes, and places.
2. Where are the Bass Rock and Bell Rock? Read Southey's poem, 'The Inchcape Bell.'

THE LOWLANDS: THE CENTRAL PLAIN.

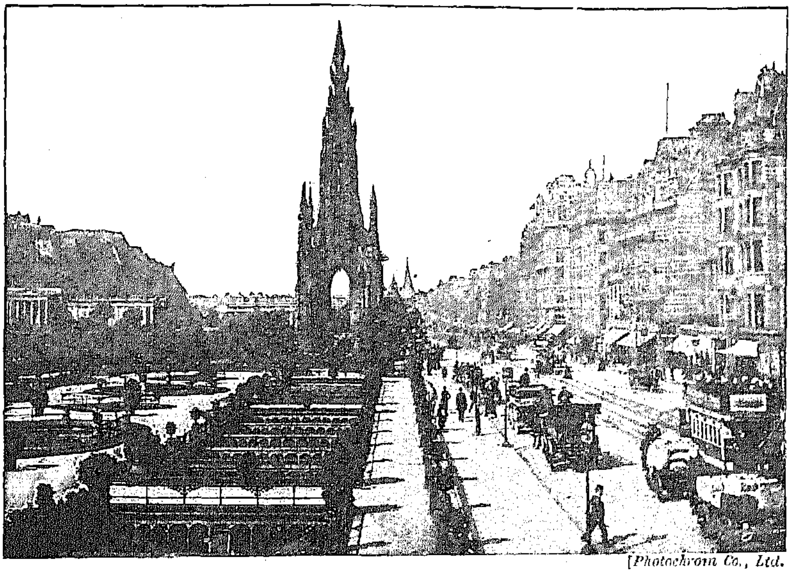
This diagonal plain, which lies between a line joining the Firth of Clyde to Stonehaven and a fault from Girvan to Dunbar, consists of carboniferous limestone, and is rich in coal. This, added to its fertility, has caused it to be densely peopled.

The coal-field of south Fifeshire has aided the linen industry of Dunfermline and the manufacture of linoleum at Kirkcaldy. Cupar, the county town of Fifeshire, is an agricultural centre, while St. Andrews is noted for its old University and golf links.

Edinburgh, the capital of Scotland, grew up on the hilly ground around the castle-crowned basaltic crag which guards the gap between the Pentlands and the sea. It thus controls routes into England by way of the east coast, or to Carlisle by the valleys of the Gala and Teviot, tributaries of the Tweed. Routes now followed by railways also diverge from it south-westwards by way of Carstairs junction, the Clyde, and Annan valley to Carlisle, westwards to Glasgow, and north-westwards to Queensferry and over the Forth bridge. Edinburgh possesses many buildings of great historical interest, and several of the houses leading down from the Castle to Holyrood Palace have a picturesque, semi-foreign appearance. The Palace is situated at the foot of the hill called Arthur's Seat, which, like the Castle rock, is of volcanic origin. The city has a University renowned for its medical school. Paper is manufactured, and book-printing and brewing are important industries. Leith is its natural sea-port. The counties of Linlithgow, Edinburgh, and Haddington are sometimes called the West, Middle, and East Lothians respectively. The town of Linlithgow possesses a palace of historic interest.

The mineral products of the central plain, oil-shale, coal, and iron, have given rise to various industries—*e.g.*, the distillation of paraffin; iron smelting at Hamilton, Airdrie, Coatbridge, and Falkirk; shipbuilding at Greenock, Port Glasgow, Dumbarton, and Glasgow, besides assisting certain textile industries, as cotton-thread at Paisley, and carpets at Kilmarnock.

The chief river of this region is the Clyde, which forms picturesque falls near Lanark, where it leaves the skirts of the uplands for the fertile plain. It then proceeds north-westwards through the great manufacturing district, and out into the broad estuary called the Firth of Clyde. Glasgow is situated on the Clyde, at the lowest point where it could be



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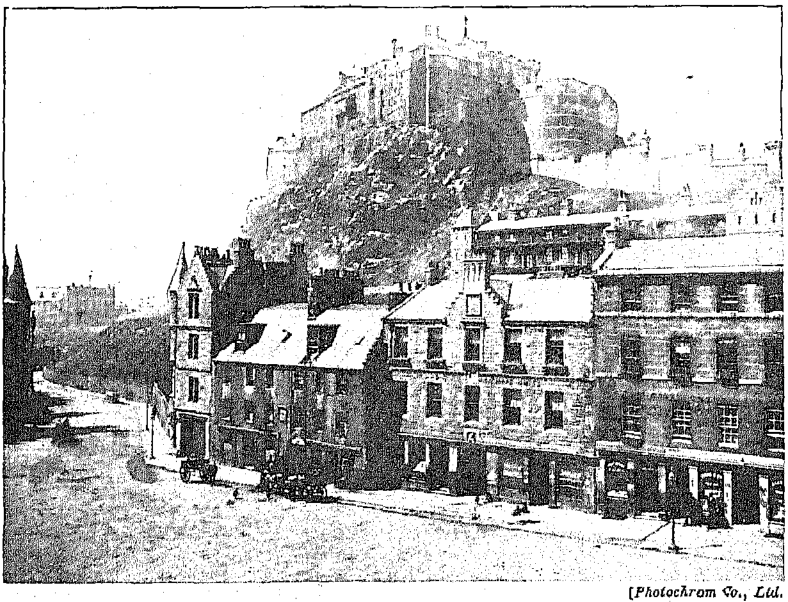
PRINCES STREET, EDINBURGH.

The monument shown in the centre is a memorial to Sir Walter Scott. Beneath the gardens in front is situated the Waverley Market. At the foot of the hill and in the extreme left are the Scottish National Gallery and the Royal Institution.



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EDINBURGH CASTLE.

Part of it is now used as barracks.

bridged in early days, and thus became a centre for traffic passing east and west, as well as up and down the river route. It has only risen to great importance since the Clyde was deepened in 1768 to allow of its use as a harbour by ocean vessels, and since coal and iron were mined in the vicinity. The trade which had sprung up with America and the West Indies benefited by these changes, while the Clyde also became famous for the steel shipbuilding industry. Machinery is also manufactured at Glasgow, and chemical works and potteries are important. It is now the largest town in Scotland, and the second largest in the United Kingdom, having a population of just over 1,000,000.

Greenock is noted for sugar-refining as well as for shipbuilding. Ardrossan and Ayr are small manufacturing towns and ports which form outlets for the rich coal-field of Ayrshire.

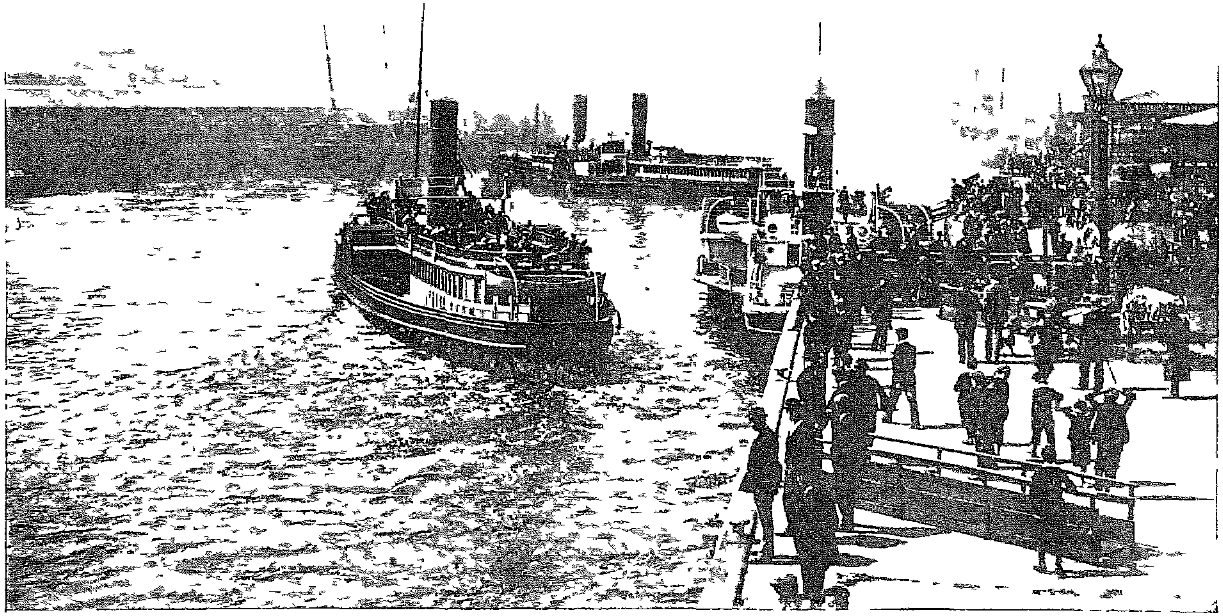
SUGGESTIONS.

1. Enumerate the advantages of the sites of Edinburgh and Glasgow, and give reasons why the former rose into importance before the latter.
2. Draw a map of the Clyde basin, filling in the chief towns.
3. State the natural routes leading into the central plain from the south and from the north, and by what places they could be defended if necessary.

THE SOUTHERN UPLANDS.

These consist of shales, limestones, and other sedimentary rocks of greater age than those of the central plain, but not crystalline like those of the Highlands. They occupy most of Southern Scotland, and form the water-parting of that area. Near the centre rise the Tweed, Clyde, and Annan, and the fact that the two latter are in the same line, though flowing in opposite directions, has facilitated the construction of a railway following the valley routes to Carstairs Junction. The Nith passes completely across the Uplands west of the Lowther Hills, and separates the characteristic rounded eastern hills from a more irregular mass in the west. North of the Tweed the Lammermuir Hills extend so far eastwards as only to leave a narrow coastal route to Edinburgh, castle-guarded at Dunbar, which has, therefore, been the scene of some important battles. The Lammermuir Hills on the west are separated from the Moorfoot Hills by the Gala tributary of the Tweed, which defines another route towards the capital.

The Uplands are mainly covered with short heath and coarse grass, affording pasturage for a large number of sheep, which has therefore helped to establish the woollen industry in the Tweed valley. The



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THE BROOMIELAW, GLASGOW.

The quays belonging to the port of Glasgow extend for about six miles along the river, and some of the docks are about 30 feet deep at high tide, and thus capable of accommodating the largest vessels ample supply of pure water for washing the wool has also contributed to the success of the industry, and woollen goods, some of which are appropriately called Tweeds, are manufactured at Peebles, Galashiels, Selkirk, Hawick, and Jedburgh.

Trees are rare except along the sheltered river-courses, where bushes, the mountain-ash, birch, and others harbour numerous singing birds, and wildflowers abound. Burns has many allusions to the beauties of the bonny banks and braes of the streams of this upland region—a district he knew well, since he was born near Ayr. Geikie describes the general character of the Uplands as follows: "From the sky-line on either side, gently but boldly drawn curves of bent-covered moorland sweep down in grassy meadow on the floor of the valley. These are the architectural forms of the hill slopes, and remain distinct at all seasons of the year. But their beauty and impressiveness vary from month to month, almost from hour to hour. For the most part they are aglow with colour, now purple with heath blooms, now bright-green with bracken, now yellow with golden bent, now deepening into orange and russet as the early frosts of autumn lay their fingers on the ferns."

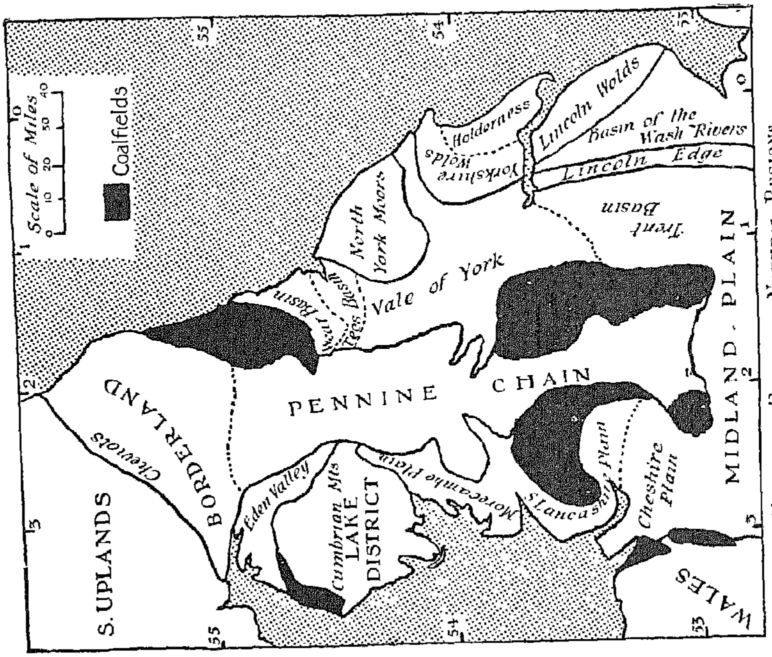
The Tweed flows through a broad fertile valley, and is fed by the Ettrick, Yarrow, Teviot, and other tributaries noted for their beauty. The district has a further interest on account of the picturesque abbeys of Melrose, Jedburgh, and Kelso, and its associations with Sir Walter Scott, who dwelt at Abbotsford, on the Tweed, near its confluence with the Gala.

The coastal plain of Ayrshire and the southern counties is very fertile, and Wigtonshire and Ayrshire are noted for cattle and dairy produce. The Mull of Galloway is within about twenty miles of Ireland and Stranraer is a packet station for that country. Dumfries stands at the head of the navigation of the Nith, the valley of which serves, like the Annan valley, as an important route through the Uplands.

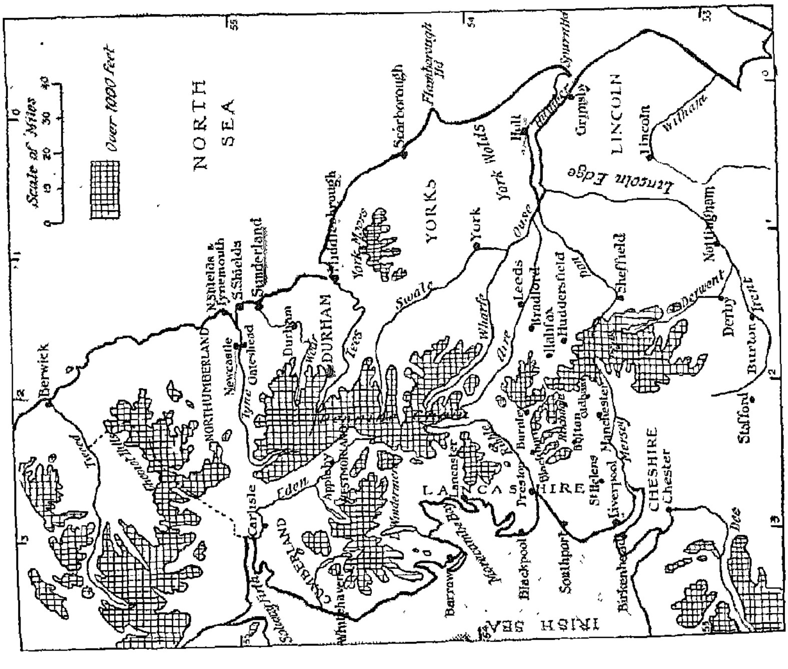
The gap between the Cheviots and the head of the Solway estuary allows of easy communication between Carlisle and the coastal plain, while the valley of the Liddel, which flows into Solway Firth, defines the route to the Tweed, and on, viâ Galashiels, to Edinburgh.

QUESTIONS ON SCOTLAND.

1. How has the relief of Scotland and the direction of the river-valleys influenced the course of the chief railways?
2. Read the description of Melrose Abbey given by Sir Walter Scott in the 'Lay of the Last Minstrel,' at the beginning of the second canto.



NORTHERN ENGLAND: NATURAL REGIONS



NORTHERN ENGLAND: PHYSICAL AND POLITICAL.

ENGLAND.

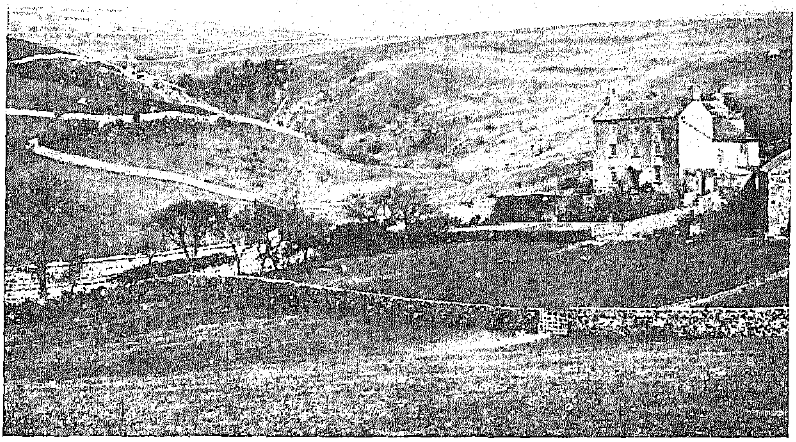
Taking into consideration the relief of England and the watershed, it seems best to divide the country into the following regions : North England falls into the Cheviot district, the Pennines, regions east of the Pennines, the Cumbrian Mountains, and other regions west of the Pennines ; Central England consists of the Trent basin, the Cheshire plain and Severn basin, the basins of the rivers flowing into the Wash, the coastal region to the east, and the greater part of the Thames basin ; Southern England subdivides into an eastern area of chalk land, a central series of south-coast river basins, and the south-west peninsula.

Mr. Mackinder, in the following passage, which occurs in his book entitled 'Britain and the British Seas,' Chapter XIV., has ably contrasted the life of the fertile lowland regions of South-East 'Metropolitan' England with that of the upland and 'Industrial' districts of the north-west. He writes: 'The life of Metropolitan England is chiefly conditioned by three circumstances: (1) Nearly all the main roads and railways converge upon London ; (2) the coast-line, extended from Norfolk to Cornwall, everywhere looks across the Narrow Seas to the neighbouring Continent; and (3) there are no considerable sources of mechanical power. As a consequence, nine tenths of the army in Great Britain is stationed within Metropolitan England; the three great naval ports are there; the commercial as opposed to the industrial control is there; and the whole region has more or less of a residential character. Industrial England, on the other hand, has several important cross-roads, but a less immediate connection with the Continent. It has but a small population of the leisured class, for rich and poor alike are workers, and as a result the prevalent opinion both in politics and religion differ not infrequently from those of the Metropolis. Moreover, the social life of Metropolitan England is old and aristocratic, whereas that of Industrial England is new and more democratic, for Industrial England, as a great community, is even more recent than the New England of America.'

THE CHEVIOT DISTRICT.

The political dividing-line of England and Scotland, beginning at the east, runs north of the Tweed, but soon follows that river, and then the Cheviot Hills, and finally it crosses the level land at the head of Solway Firth. The higher parts of the Cheviots consist of igneous rock ; the general appearance of the hills is of rounded, treeless, grassy slopes, very suitable for sheep-walks. As an upland region of sparse population the range is a fitting boundary, and the bog, known as the 'Solway Moss' before it was drained, partly protected the gap between the hills and the sea on the west.

The broad gap on the east, however, was very much exposed to invasion in the Middle Ages, and Berwick, situated on the coastal route, has only been continuously in English hands since 1482. The common insecurity of life in former days is illustrated by the castles of Alnwick



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INGLEBOROUGH.

Notice the stone walls which are a characteristic feature in the north of England (see p. 16).

and Newcastle. Two of the most famous battlefields in the 'Borderland' are Flodden Field, on the route into Scotland which follows the Till tributary of the Tweed, and Otterburn (Chevy Chase), on the route across the Cheviots by Carter Bar. Probably the islands off the coast were the safest places in warlike days, and were therefore chosen by early Christians as centres of missionary work. Lindisfarn Cathedral on Holy Island was once very famous.

Between the Cheviots and the Pennines is a deep depression followed by the South Tyne and the Irthing tributary of the Eden. The Romans built a wall just north of this depression called 'Hadrian's Wall,' which marked the northern limit of their territory for many years. The valleys are now utilized by the railway from Newcastle to Carlisle, which is an important railway junction commanding also the western routes into Scotland and the Midland and North-Western lines to London. The town was early fortified by a castle on account of the strategic importance of the site, and it also possesses a cathedral.

THE PENNINES.

This belt of mountainous moorland forms the backbone and watershed of Northern England. It extends southwards till it ends in the picturesque Peak District of Derbyshire, but it is nearly severed by the depression between the valleys of the Aire and Ribble near Skipton, under 500 feet high, which is utilized by the Midland Railway between Leeds and Carlisle and by a canal between Leeds and Preston (see p. 9). The Pennines are connected with the Cumbrian group by a ridge of land 1,000 feet high called Shap Fell, and are separated from it by the Lune, which flows south, and the Eden and its tributary, the Petterill, which flow north.

Many of the peaks in the range are over 2,000 feet high—*e.g.*, Cross Fell (2,900), Mickle Fell, Bow Fell, Whernside, and Ingleborough—and the average height is such that it affects the climate of North England. The prevailing westerly winds are forced to rise in front of the range, the air expands, cools, and the moisture which the winds contain falls as heavy rains on the western slopes and the plains still farther west, after which they pass on to eastern districts, often as dry winds. (Compare the rainfall of Leeds and Bolton, given on p. 24.) Parts of the Pennines are utilized as sheep pastures, but agriculture is confined to the fertile river-valleys which furrow it, and where the inhabitants mainly dwell. The height of the range and its great breadth—over forty miles in one place—has caused it to be a great barrier to communication, especially in former days, whilst on account of its barrenness it is sparsely peopled, save where minerals are found.*

The Pennines were formed long ago by an upfold of carboniferous rocks, but the coal, which was then all over the top, has been worn away till now it is only found on the flanks—*i.e.*, the coal-fields of Northumberland, Durham, Yorkshire, and Lancashire. Underneath this was a layer of millstone grit which, though much worn away in places, still caps the higher peaks, and is largely found in the middle part of the range. Below this, and now often at the surface, is gray carboniferous limestone. The scenery of these two rocks presents a great contrast. The brownish millstone grit forms plateaus of heathery moorland over

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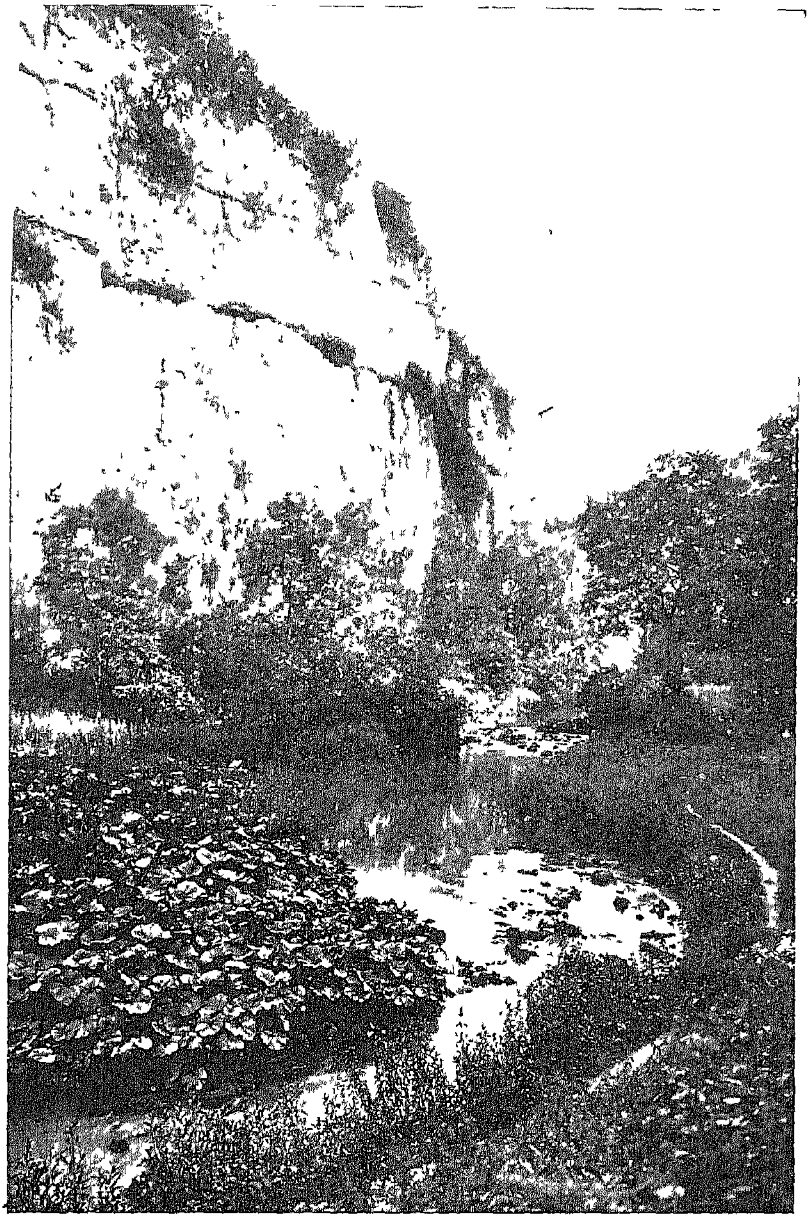
* The range is, however, now crossed by several railways and by three canals—the Leeds and Liverpool canal with its branch to Preston mentioned above, and two which connect the Calder tributary of the Ouse to the Irwell tributary of the Mersey. One of these passes through Halifax, and the most southern one through Huddersfield, and then through the Stanedge tunnel, which is three miles long and about 650 feet above sea-level (see p. 9).



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Miller's Dale and the Wye, Derbyshire.

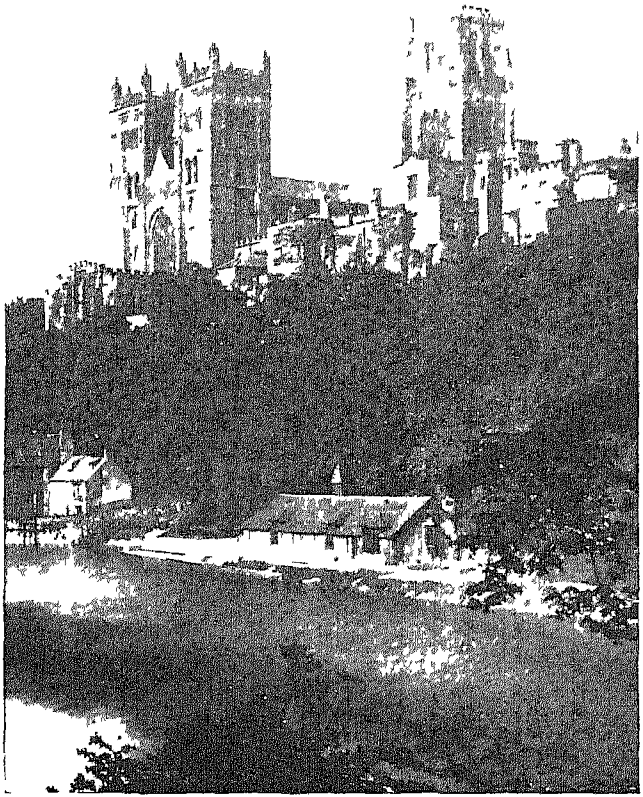
Miller's Dale is not far from Buxton, and the Wye is a tributary of the Derwent which flows into the Trent. The rock shown is carboniferous limestone.

which are scattered huge stones, often worn into peculiar shapes, while the basin-like valleys have steep rocky upper slopes, but gently curving grassy floors. The plateaus of light-gray limestone are generally covered with grass, intersected by stone walls, and diversified by a few wind-blown clumps of trees. The 'mountain' limestone in places forms perpendicular cliffs on the sides of the hills, while the flat surfaces on top are frequently seamed by numberless small fissures filled with ferns. The valleys are deep narrow ravines, decked with a rich and varied vegetation wherever water occurs.

The streams, however, often disappear into the ground through cracks in the limestone called 'swallow-holes,' and, by solution, form subterranean chambers and vast caves. Probably the slope of the rocks will cause these streams to reappear at the surface farther on in their courses, and thus after traversing an arid region a fair-sized river may be suddenly found issuing from a cave and creating a fertile dale.

The Peak District of Derbyshire is particularly famous for the size and beauty of the caverns around Castleton. In 'Speedwell Mine' it is possible to go for half a mile in a boat along a subterranean canal, in a narrow passage till the water falls into a deep pool in a vast natural cavern, probably over 450 feet in height. The caves of the Blue John Mine are adorned with stalactites, which look like icicles of semi-transparent rock hanging from the roof. Water, in passing through the rock, has dissolved a great deal of lime, and when it is suspended as a drop from the roof of a cave it evaporates, and the lime is deposited. Other drops trickle over the same spot, and so in time the deposit increases, whilst stalagmites are similarly formed where the drops fall on the floor of the cave. Sometimes the stalactites and stalagmites unite, forming pillars, and the damp walls are clothed with sheets of stalagmite, which look like folds of drapery. The Blue John stone found in the cave of this name is made into ornaments, but it was the veins of lead in this locality that first brought the miners who discovered the caves (see p. 69).

Sometimes water penetrates very far down into the earth till it is warmed by the hot interior, and dissolves sulphur, iron, and other minerals with which it comes in contact, as well as rocks. Occasionally the slope of the rocks and other causes may combine to produce hot springs at the surface which have a medicinal value, and these may give rise to towns—*e.g.*, Harrogate in Yorkshire.



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DURHAM CATHEDRAL, OVERLOOKING THE WEAR.

QUESTIONS AND SUGGESTIONS.

1. What rivers rise on the Pennines, and where do they flow?
2. Draw diagrams showing various ways in which springs may be formed.
3. Compare and contrast the Pennines and the Southern Uplands of Scotland
4. Why was the whole of north England so sparsely populated before the eighteenth century?

THE NORTHUMBERLAND AND DURHAM COAL-FIELD.

This coal-field is associated with the iron industry, and particularly with shipbuilding, since ships are now made largely of iron and steel. The iron ore is brought from the rich iron mines of Cleveland, in North Yorkshire, and the limestone which facilitates the process of smelting is near at hand. The chief towns engaged in shipbuilding are ports along the lower course of the Tyne—Newcastle, Gateshead, Jarrow, and North and South Shields; Sunderland on the Wear, Middlesbrough on the Tees, and the Hartlepools. Most of these places also export coal in large quantities, notably Newcastle. The towns on the Tees—*e.g.*, Darlington, Stockton, and Middlesbrough—are also engaged in the iron industry, and the first-named specializes in locomotives. Tynemouth, north of the Tyne's mouth, is a watering-place.

Newcastle is named after the Norman castle erected near the place where the Romans previously had bridged the Tyne, and so created a focus of routes. Guns are made there, and the manufacture of glass and chemicals has been stimulated by the salt found in the locality.

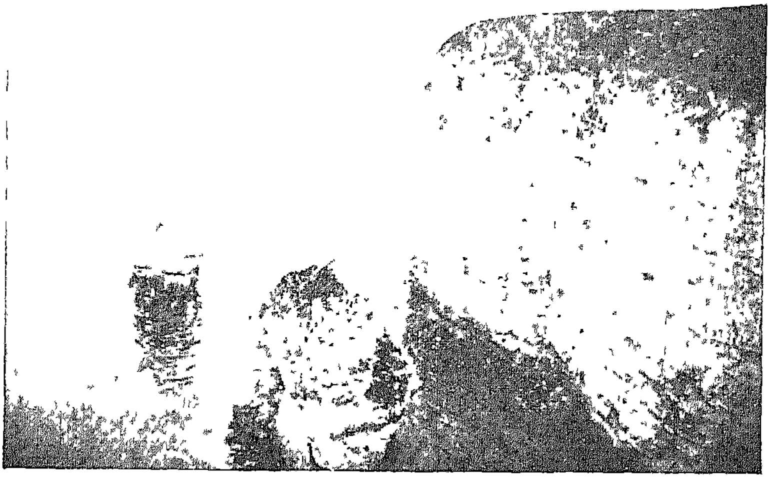
The city of Durham stands in the midst of a fertile area, and is built where a rocky promontory, three parts surrounded by the Wear, forms an excellent site for its castle and beautiful Norman cathedral. It has also a university.

THE BASIN OF THE OUSE. YORKSHIRE.

Yorkshire is divided for political purposes into the East, West and North Ridings, but on account of the variety of its geological structure it may be also divided into the following areas: Holderness, the Wolds, the North Moors, the plain of York, and the Pennine slopes.

Holderness is a stretch of low land, formed by glacial drift, clays, and gravels, which terminates in Spurn Point. It was formerly well wooded, and is now very fertile, though marshy in places. Kingston-on-Hull, or Hull, is the great outlet for much of the produce of Lancashire, as well as of Yorkshire, on account of the railways and canals which cross the Pennines. It carries on a large trade with the Baltic and North Europe, and even has large liners plying regularly to the United States.

The hills called the *Wolds* are composed of chalk, and terminate in the majestic cliffs of Flamborough Head, north of Bridlington Bay (see pp. 11 and 59). These cliffs are capped with glacial drift, and the contrast between the reddish-brown soil, green grass, white precipices,



CHALK CLIFFS NEAR FLAMBOROUGH HEAD.

Notice how the sea has evidently eroded away the softer parts, leaving the two isolated stacks.

and blue sea contribute to the beauty of the scenery. The Wolds present a bold front to the north-west, and dip gently to the south-east, with rounded, grassy, treeless surfaces. Most of the inhabitants of the district dwell in villages of whitewashed and red-tiled cottages, which cluster around the graystone churches, forming a chain at the foot of the hills, for here it is that the water, which rapidly filters through the porous chalk to the less porous rocks on which it rests, reappears in the form of springs.

The North Yorkshire Moors are separated from the Wolds by the fertile Vale of Pickering, or valley of the Derwent, which allows of easy communication between York and the coast. The coast is very grand, and fishing-stations and popular watering-places have arisen where natural ravines allow of descents being made from the high cliffs to stretches of sand along the seashore. Scarborough has a magnificent situation on the top of the cliffs overlooking the two bays, separated by a castle-crowned promontory, while the picturesque red-tiled houses of Whitby climb down one side of the ravine of the Esk to the fishing-harbour at its mouth, and up the other side to the famous ruined abbey of St. Hilda, associated with the poet Cædmon. The beauty of Whitby is enhanced by the bright coloured rocks of the vicinity,—blue-gray lias, red glacial drift, and yellow-sandstone. Jet is also found in the rocks near there and manufactured into trinkets for sale, though the industry has declined.

The heathery moorland, which is composed of various 'oolitic' rocks —*e.g.*, limestone, grits, and sandstone—is sparsely peopled, save where the iron ores of Cleveland have attracted a growing mining population Middlesbrough manufactures and exports iron goods, builds ships, and has now a fine harbour.

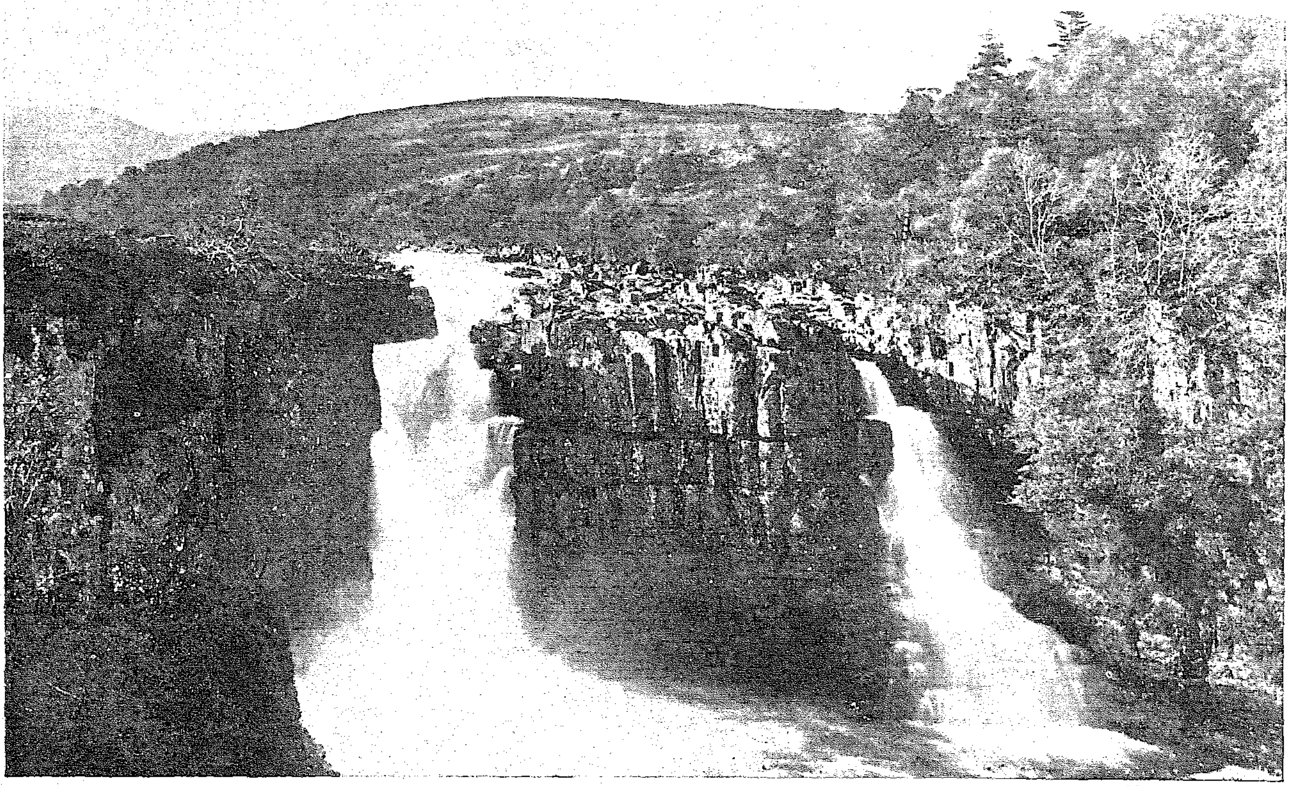
The *plain of York* consists of clays and gravels, and is very fertile Horses are reared in large numbers, and the district is dotted with agricultural centres, such as Northallerton, Ripon, and Doncaster. Ripon has a cathedral, and near it are the beautiful ruins of Fountains Abbey.

York stands in the midst of the plain where the navigable river Ouse is bridged, and on the natural route leading north and south. The Romans made a colony on this important site, and later a town arose, and was surrounded by massive walls, which are still standing. It is possible to walk along these walls, which are pierced in places by gateways, called 'bars.' The city possesses a beautiful cathedral, and is the seat of an archbishopric.

Western Yorkshire consists of the Pennine moorlands, and of the 'dales' or valleys of the many tributaries of the Ouse which furrow it. Many of the dales are extremely beautiful, some on account of the waterfalls formed by the rivers in crossing comparatively hard ledges of rock—for example, High Force, on the Tees, which river forms the northern boundary of Yorkshire. The beauties of Wharfedale are enhanced by the ruins of Bolton Abbey.

The coal-measure sandstone of the Pennines near Rotherham makes excellent grindstones, and this has aided the development of the cutlery industry of Sheffield This town is situated on the Don, which has been canalized to this point, and flows past Rotherham, where brass is manufactured, and past Doncaster, noted for railway stock.

The chief industry of Yorkshire is, however, the manufacture of woollen and worsted goods, which was first established here because of the good pasture-lands for sheep, the abundance of pure water for washing the wool, and the supply of timber for fuel. Now most of the wool is imported, and the great coal-field of the West Riding supplies the fuel. Leeds, which commands routes across the plain of York, and



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TEESDALE : HIGH FORCE.

This waterfall has been formed by a layer of soft rock cropping out from beneath a layer of relatively hard igneous rock in the river bed, and, being weaker, suffering more rapid erosion.

westwards by the Aire valley, is the centre of woollen manufacture, while Huddersfield, Wakefield, and many other towns are engaged in branches of the industry. Bradford is noted for worsteds, which differ from woollen goods in that the wool is not 'milled' or 'felted' together by beating after being woven. Halifax specializes in carpets. The great outlets for these manufactures are Goole and Hull on the east, and Manchester and Liverpool on the west, on account of the excellent communication in both directions by rail and water.

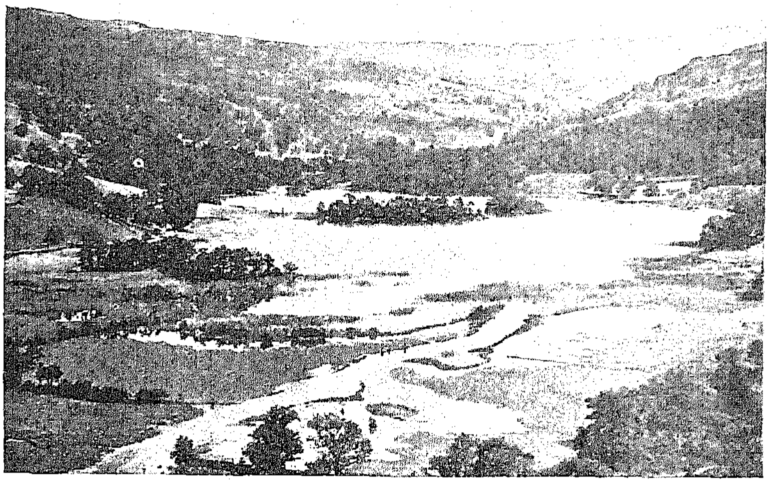
SUGGESTIONS.

1. Draw a map of the Ouse basin, filling in the chief tributaries and places mentioned.
2. Give a description of the coast from Hull to Middlesbrough.
3. Read Wordsworth's poem, 'The Force of Prayer,' which refers to the foundation of Bolton Abbey.

THE CUMBRIAN MOUNTAINS AND LAKELAND.

The prevailing rocks in this district are varieties of slate, though igneous rocks also occur. At one time the region possibly had a dome-shaped appearance, but it is now trenched by deep valleys, which seem to radiate in all directions from a tract of high land running from Sca Fell (3,200 feet high) to Helvellyn (3,100 feet high). The river valleys, generally called dales, are separated from each other by mountainous ridges covered with grass, bracken, and heather, and are extremely beautiful. The excessive rainfall promotes a luxuriant vegetation in the sheltered parts, and supplies the numerous streams, which form picturesque falls in their upper courses, and where the valleys are wider expand into long, narrow lakes. The largest lake, Windermere, is twelve miles long. The beauty of Lakeland has caused it to be the home of several noted artists, poets, and writers. Ruskin spent the latter part of his life near Lake Coniston, and Wordsworth lived first near Grasmere, and afterwards near Rydal water.

Sheep-farming is the chief occupation, and Kendal, in Westmorland, still carries on a small woollen industry. Some plumbago mines in the district gave rise to the manufacture of pencils at Keswick, which is situated near Derwentwater, but the graphite has now to be imported from Ceylon. Appleby, the county town of Westmorland, stands on the Eden route now followed by the Midland Railway.



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RYDAL WATER.

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WINDERMERE.

Notice the long narrow shape of the lake.

COASTAL CUMBERLAND AND NORTH LANCASHIRE.

Workington and Whitehaven stand on the small Cumberland coalfield, but more important than the coal is the large supply of iron mined between Workington and Morecambe Bay. The Furness peninsula is particularly rich in the red hematite iron, which requires no limestone to smelt it. The iron industry has led to the shipbuilding industry at Barrow, where a fine artificial harbour has been created.

Lancaster stands at the mouth of the Lune, and commands the natural direct route to Carlisle from Preston vià the Lune valley, over Shap Fell, and on through the Peterill valley. The fine stretches of sand along the coast have given rise to seaside resorts for the large industrial population of South Lancashire at Blackpool and Southport.

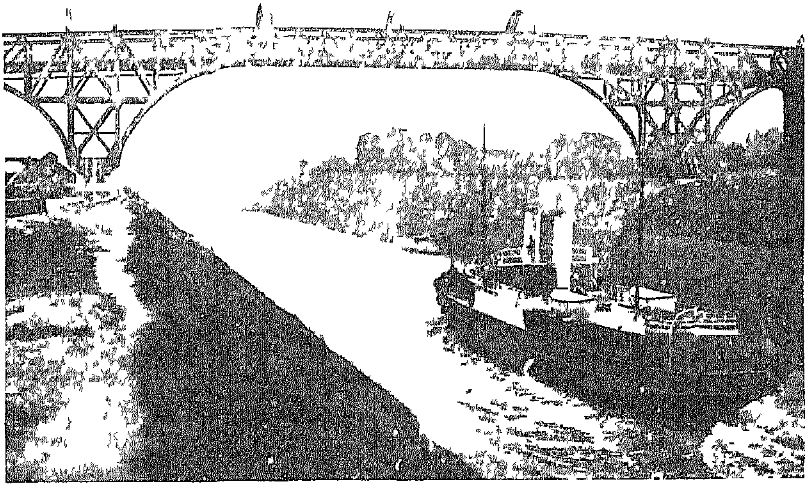
THE SOUTH LANCASHIRE COAL-FIELD.

The development of the great cotton industry of this district has been aided by the local supply of coal, the facilities for importing raw cotton from the United States and exporting cotton goods, and by the moist climate, which enables very fine threads to be spun and woven without breaking.

Manchester is situated on the plain near the base of the Pennines, where several valley routes converge from the north and east, while communication westwards is naturally easy. It is a great collecting and distributing centre rather than a cotton manufacturing town, and since the opening of the ship canal has become a large port. It forms one town with Salford on the other side of the Irwell.

The cotton-manufacturing towns of Bolton, Bury, Rochdale, Oldham, and Stockport (in Cheshire) form a semicircle round Manchester, and lie mainly on the lower slopes of the encircling north-east moorlands, where water-power is available. Oldham and Bolton are the chief spinning centres, while the most important cotton-weaving towns are in the valley of the Ribble—*e.g.*, Burnley, Blackburn, and Preston. The salt found in Cheshire is used in the glass factories of St. Helens and the chemical works at Widnes, which is situated on the Mersey due south of St. Helens.

The manufactures of this area are mainly exported from Liverpool, but also largely from Manchester, London, Grimsby, Hull, and Southampton. Liverpool only rose into importance with the industrial development of the region behind it, which is naturally infertile, and with the



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THE MANCHESTER SHIP CANAL. BRIDGE AT LATCHFORD.

This canal is about 35 miles long, 26 feet deep, and 120 feet wide at the bottom It therefore suffices for all but the largest vessels, and allows of their passing each other. Since it was opened in 1894, the value of the trade of the port of Manchester, which includes Runcorn, has nearly increased fourfold

creation of good docks. It has also profited by the Trent and Mersey canal, which connects it with the Staffordshire potteries, and by the canals over the Pennines, as well as by the construction of railways, which enable it to collect from and distribute to several centres of dense population. About a quarter of the total value of our imports and nearly half our exports pass through it. It is connected by a railway tunnel with the seaport of Birkenhead on the opposite side of the Mersey.

QUESTION AND SUGGESTIONS.

1. Read Southey's poem on the 'Falls of Lodore,' which are close to Derwentwater, and Wordsworth's poem entitled 'View from the top of Black Combe,' a mountain in the southern extremity of Cumberland.
2. Compare and contrast the regions east of the Pennines with those to the west.
3. Water from Thirlmere Lake is used to supply Manchester. About how many miles has it to be conveyed?

THE CENTRAL REGION.

This lies between the Pennines, the Welsh mountains, and the steep front or escarpment of the oolitic rocks, near the base of which flow the Avon, tributary of the Severn, and the Trent in its lower course. The area on the east adjoins the flat lands around the Wash, and since the chalk escarpment to the south-east is low, it is in easy communication with the lower Thames basin. It has a northward extension in the vale of the Ouse, a westward extension in Cheshire drained by the Mersey, Weaver, and Dee, besides a south-westward continuation in the valley of the lower Severn.

The comparative flatness of the land has facilitated the construction of canals joining all the chief rivers, and of roads and railways in all directions (see pp. 7 and 9). In Roman times three of the important roads that radiated from London went to York, Chester, and Gloucester, which guard the three extensions of the plain mentioned above.

The region largely consists of red fertile clays and gravels, but coal occurs in North and South Staffordshire. Outside these coal-fields the area forms a rich agricultural district, and although forests, like that of Arden and others, which formerly covered much of the land, have been cut down, there are many fine trees in the fields and hedges which add greatly to the beauty of the district. The long recognised importance and rural wealth of the plain are illustrated by its magnificent residential castles, fine old manors, and quaint brick and timber houses, while many places are full of historical and literary associations.*

The Avon flows past Rugby, famous for its public school; Leamington, an inland watering-place; the quaint town of Warwick, with its old gateways and stately castle; Stratford, where Shakespeare lived; and Evesham, with its rich orchards and market gardens, till it joins the Severn at Tewkesbury, noted for its beautiful abbey. Kenilworth, with the extensive ruins of its castle where Queen Elizabeth was once entertained, lies a little north of Warwick, and not far distant is another old-fashioned town, Coventry, where silk ribbons used to be manufactured, though it is now chiefly noted for cycles.

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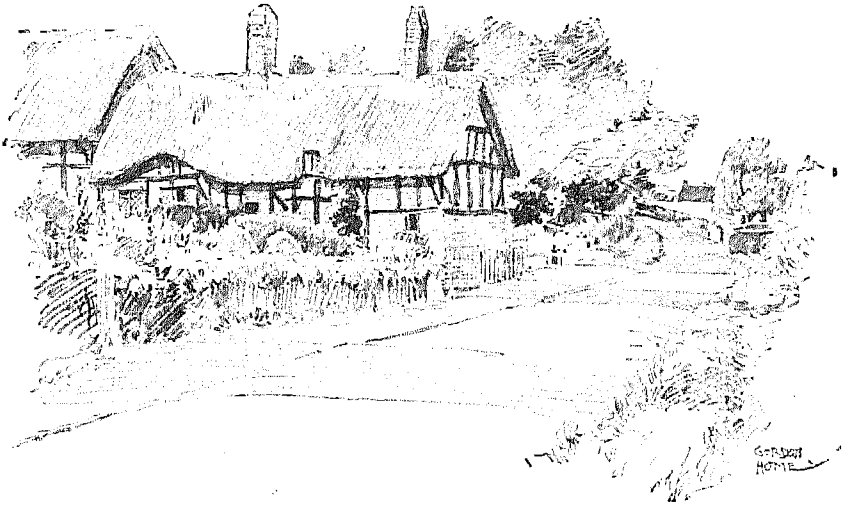
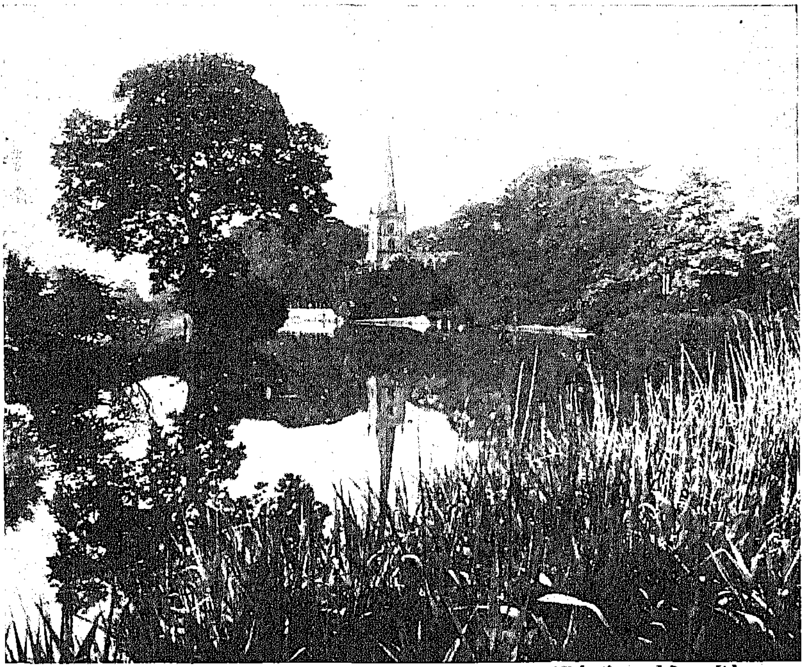
* Stevenson, in the following passage, has sketched the characteristic features of this type of rural English scenery: 'The warm habitable age of the towns and hamlets, the green, settled, ancient look of the country, the bush hedgerows, stiles and privy pathways, the sluggish brimming rivers . . . they are all set to the English air in the child's story that he tells himself at night.'



ANNE HATHAWAY'S COTTAGE, STRATFORD-ON AVON.
Shakespeare married Anne Hathaway.



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STRATFORD-ON-AVON.
Shakespeare's tomb is in the church shown in this view.

THE TRENT BASIN.

The upper valley of the Trent is associated with the earthenware industry, coal and suitable clay for coarse work existing in the vicinity. The district is often called 'The Potteries,' and the chief towns engaged in this industry are Stoke and Hanley. They also manufacture china, but the necessary clay for this has to be brought from the Cornish peninsula. It is formed of decomposed granite, and called kaolin.

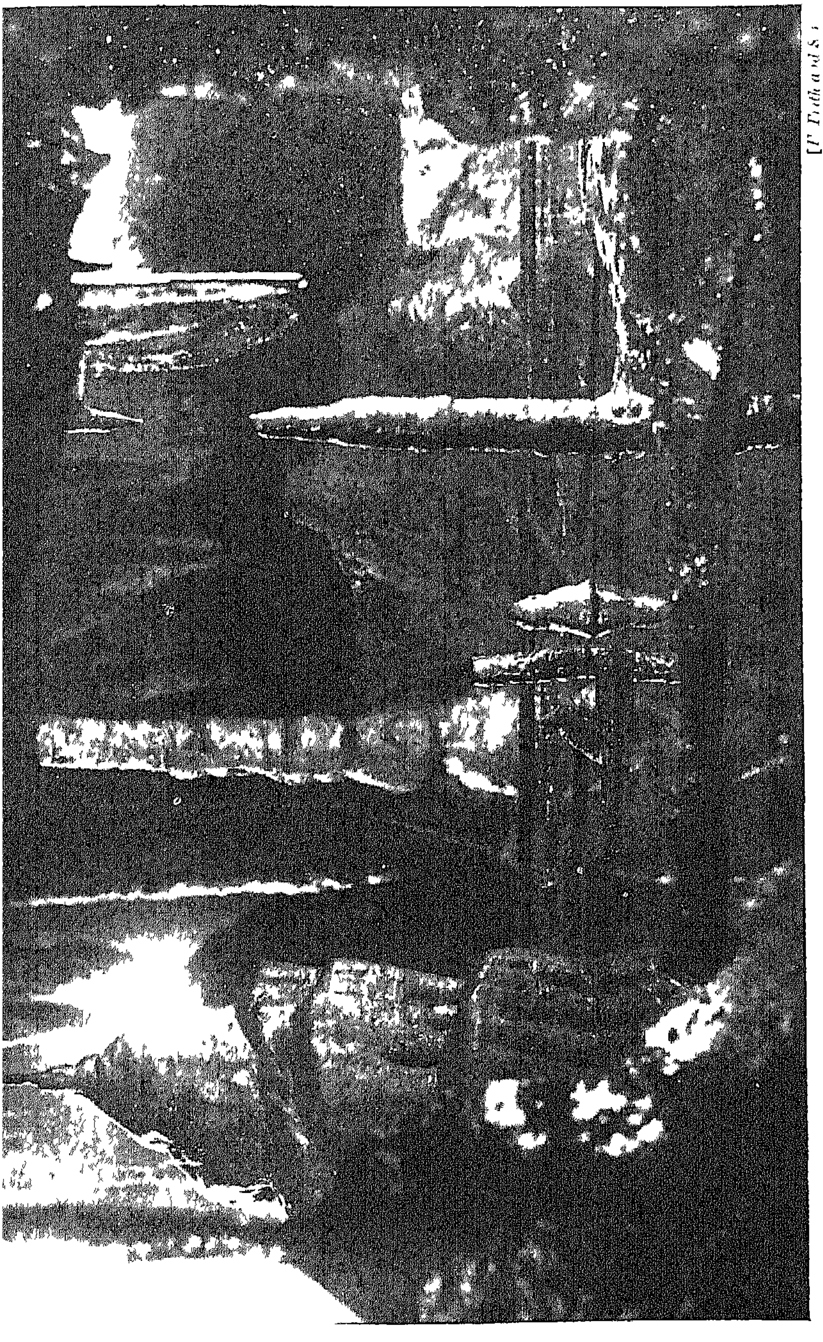
The pastures of the plain are devoted to cattle-rearing in the west, which has given rise to a leather industry. Boots and shoes are made at Stafford, and saddlery at Walsall. Long ago iron was found in this region, and smelted with charcoal from the forests. Now iron has to be imported, as the local supply is hardly worth working, and the coal of the district is used instead of wood. The smoke and piles of cinders and slag from the great furnaces, which are kept burning night and day, and cause a lack of vegetation, have given the name of 'Black Country' to this area, which includes parts of North Warwickshire and Worcestershire as well as Staffordshire.

Various towns specialize in the manufacture of different kinds of hardware, and Birmingham has risen to be the most important collecting and distributing centre of the district, with railways and canals radiating in all directions. Steam-engines and firearms are among its manufactures, but it is particularly noted for small metal goods and jewellery. The city possesses a university.

The smaller towns in the vicinity—*e.g.*, Wolverhampton, Walsall, West Bromwich, etc.—manufacture almost every conceivable kind of iron and steel article. Redditch (Worcestershire) specializes in needles and fish-hooks, Walsall in bedsteads and locks, Bromsgrove (Worcestershire) in nails, etc. To the coal is probably due the fire-clay industry of Stourbridge (Worcestershire), and the manufacture of carpets at Kidderminster (Worcestershire).

The Trent, after passing the moorland of Cannock Chase on the right, bends north-eastwards and receives the tributary Tame, near to which is Lichfield, with its fine cathedral. Burton-on-Trent has become the largest beer-brewing centre in the country, mainly on account of the suitability of the water. Some of the barley required is grown in the central plain, and the hops are largely brought from Worcestershire.

The Derwent and Dove, tributaries of the Trent, rise in the most picturesque parts of the Peak district. Buxton and Matlock are favourite



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THE INTERIOR OF ONE OF THE CHEDDAR CAVES IN THE MENDIPS (see p. 94).

These caves, like those in the Peak district, have been formed through water percolating through the carboniferous limestone and dissolving it away. Notice the stalactites hanging down and the stalagmites standing up.

inland resorts noted for medicinal springs and the beauty of their surroundings (see pp. 55, 56, 69).

Derby has become an important railway junction, and the Midland Railway Company has erected great engineering works there. It lies near the coal-field that traverses South Yorkshire, East Derbyshire, and West Nottingham, and the coal has aided its manufactures, which include china and silk. The latter industry largely depends on a supply of pure water, such as the streams of the Southern Pennines afford, and is therefore also important at Chesterfield in Derbyshire and Macclesfield in Cheshire.

The Soar, a southern tributary of the Trent, drains the flat agricultural country of Leicestershire, which is largely devoted to rearing cattle and a breed of sheep noted for their wool. Leicester is noted for its woollen hosiery, and also manufactures boots and shoes.

In its lower course the Trent flows due north across the counties of Nottingham and North Lincoln into the Humber. The coal, which flanks it on the west, is used by the cotton hosiery industry of Nottingham, where cotton lace is also made. For these manufactures, in which strong yarns are used, a very moist climate is not so essential as for other branches of the cotton industry.

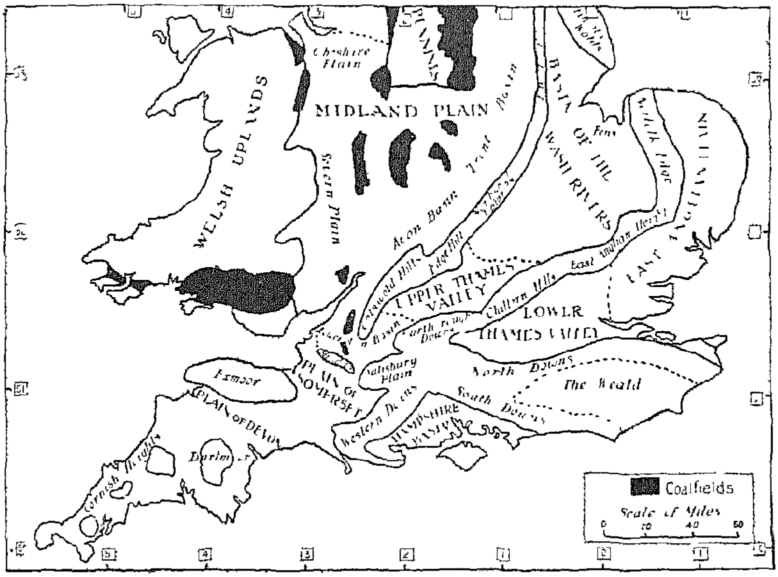
The remains of Sherwood Forest add to the rural beauty of the western portion of Nottinghamshire, and so many handsome residences have been built in the district near Worksop that it is called 'The Dukeries.' Newark and Gainsborough are agricultural centres of trade.

The Trent is connected with the Thames by the Grand Junction and Grand Union Canal system from Leicester on the Soar to Brentford on the Thames, as well as by the Oxford Canal from Burton to Oxford viâ Rugby. It is further connected with the Severn and with the Mersey by way of the Weaver (p. 9).

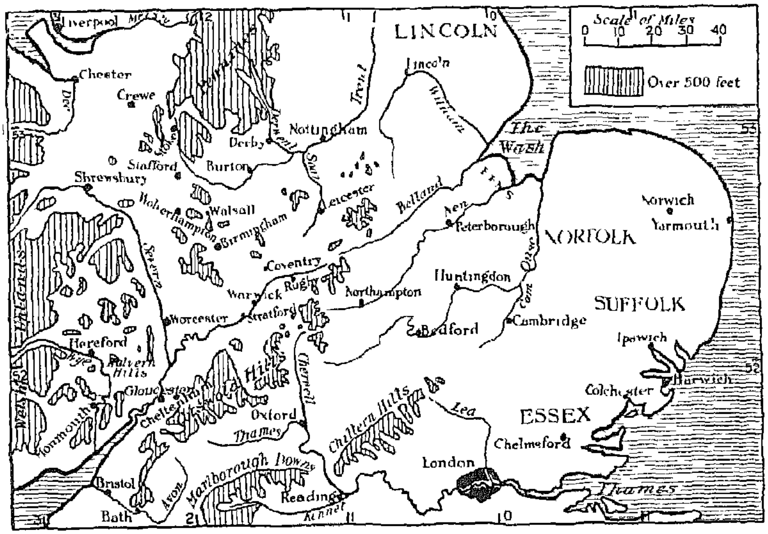
SUGGESTIONS.

1. Draw a map of the Trent basin, indicating the tributaries and towns mentioned.
2. Construct a diagram to illustrate the value of iron ore produced in the United Kingdom and imported for the following years. The values are given approximately in million pounds and one decimal of a million.

	1914.	1915.	1916.	1917.	1918.	1919.	1920.
Produced -	3·9	4·6	5·5	6·4	7·1	7·4	9·9
Imported -	5·1	7·2	11·7	12·0	13·4	11·2	16·5



Central and Southern England: Natural Regions.



The Midlands and Eastern England: Physical and Political.

THE CHESHIRE PLAIN AND SEVERN BASIN.

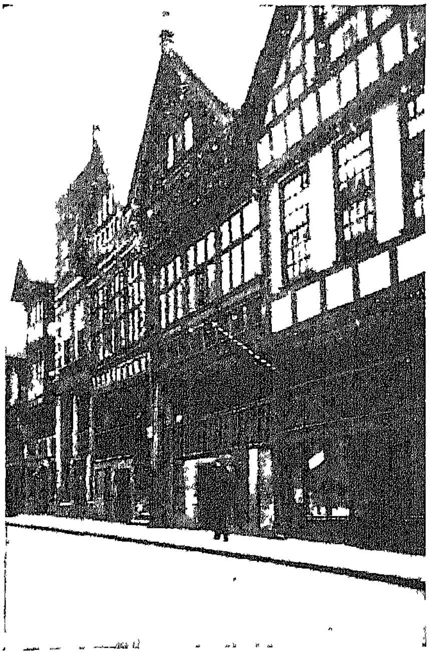
The land which borders the uplands of Wales was of great strategic importance in former times, and, to protect it, the Romans, and later the Normans and English, fortified camps or built castles at Chester, Shrewsbury, Ludlow, Hereford, Monmouth, and Chepstow. These places were easily connected by important roads running north and south at the base of the uplands, and are now still more closely connected by rail. The natural routes for communication with Wales are either along the coastal plains in the north and south, or up the valleys of the Dee, Severn, Wye, and Usk.

Chester, which guards the north-coast route, and is nearly surrounded by the Dee, still possesses the city walls, which tell of its strategic importance. It is possible to walk on these walls, which are pierced by gateways in a few places, and adorned with outlook towers. The walls, castle, and cathedral are built of the local red sandstone (Triassic), while the quaint old gabled houses, with covered galleries called 'Rows' along the second story, are of brick, timber, and plaster. These galleries are reached by steps at intervals from the street below, and behind them are some of the best shops in the city.

Most of Cheshire is flat, rich pasturage devoted to cattle-rearing, and the county is noted for cheese. It is also famous for salt, which is mined at Nantwich and elsewhere. The London and North-Western line to Chester passes through Crewe, a great railway junction with large engine works.

The Severn, which rises in Plinlimmon, turns first north and then east until, after passing near the isolated mountain called the Wrekin, it bends southwards. Then it winds in a broad valley between the Malvern Hills and the Cotswolds till it enters the wide shallow estuary, which finally merges into the Bristol Channel. The chief tributary on the right bank is the Teme, and on the left the Avon. The climate of the lower basins of the Severn and Wye is peculiarly mild, so that the counties of Hereford, Worcester, Gloucester, and Monmouth are noted for their orchards and hop-gardens, as well as for dairy produce. The agricultural wealth of the district facilitated the erection of cathedrals at the market centres of Hereford, Worcester, and Gloucester.

Shrewsbury, the capital of Shropshire, is a picturesque old town, nearly surrounded by a loop of the Severn, and standing at a convenient crossing-place.



CHESTER: THE ROWS.

Notice how the upper stories of the houses slightly overhang the lower. Houses were often thus built in towns surrounded by walls in early days in order to economise space within the enclosed area.

Worcester is situated near the junction of the Teme and Severn, and near enough to that of the Avon and Severn at Tewkesbury to have easy communication eastwards up the Avon valley. China is made at Worcester, as well as gloves. Droitwich in Worcestershire has salt-springs, while medicinal springs, combined with beautiful scenery and fine air, have made Malvern (Worcestershire) and Cheltenham (Gloucestershire) favourite inland resorts. Gloucester arose at the lowest place where the Severn could be bridged in early days, and at the head of sea navigation. On account of the silting up of the estuary, the Berkeley Ship Canal has been made to allow fairly large vessels to reach Gloucester, and to avoid some of the river windings.

The Severn is connected by canal with the Kennet tributary of the Thames and also viâ Stroud. It is also connected at Worcester with the Birmingham system of canals, and by the Upper Avon to the Oxford and Grand Junction Canals (p. 9).

The chief port of the Severn valley is Bristol, situated on the Lower Avon, which separates the Cotswolds from the Mendips, and defines a route eastwards. The city is near a small coal-field, but has lost some of its former importance, partly because large modern vessels require very deep docks. These have now been constructed at Avonmouth. Bristol early secured an important trade with the New World, importing tobacco and sugar, and has now a large import trade in dairy produce from Ireland, and a growing one of fruit from the West Indies. Its exports are comparatively small. Clifton is a fine suburb of the city, and the Avon, which here flows at the bottom of a deep gorge, is crossed by a suspension-bridge.

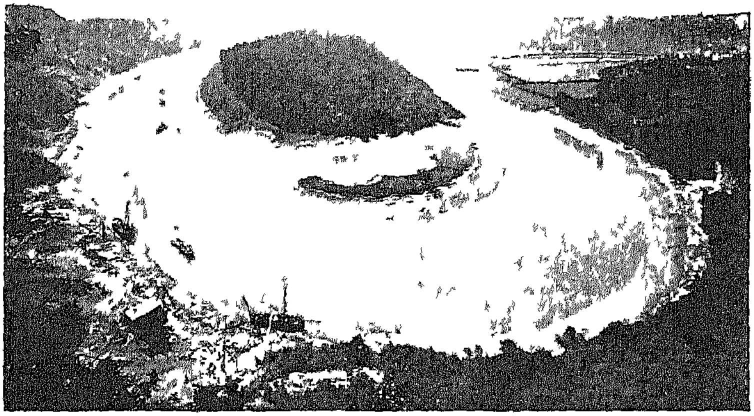
Farther up the Avon, and surrounded by a natural amphitheatre of hills, is Bath, which has been famous for its hot springs since Roman times, and attracts many visitors. In the neighbourhood 'freestone' is quarried from the Cotswolds, which are composed of oolitic limestone. Stroud in Gloucestershire, Bradford in Wiltshire, and some other towns around the Cotswolds, manufacture broadcloth. This industry arose when the sheep pastured on the hills sufficed to supply the necessary wool, and is able to persist owing to the proximity of the Bristol coal-field.

A tunnel four and a half miles long has been made by the Great Western Railway under the Severn to shorten the journey from London to South Wales. The tunnel terminates in Monmouthshire, near the mouth of the Wye.

From its source in Plinlimmon to where it enters England, the Wye flows through wild and barren scenery, but the latter part of its course is noted for its beauty. After passing Hereford it flows through a fertile district abounding in orchards and hop-gardens, and after Monmouth enters a gorge cut through the limestone rocks, rising in grand pinnacled cliffs, and covered below with a rich and varied vegetation. The ruins of Tintern Abbey stand in a romantic situation on its banks, and at its mouth is Chepstow, with a ruined castle originally built to protect the entrance to the river. The small coal-field of the Forest of Dean lies between the Wye and the Severn.

SUGGESTIONS.

1. Draw a map of the Severn basin, filling in chief tributaries and places mentioned.
2. Compare the merits of Gloucester, Liverpool, Hull, and London as outlets for the manufactures of Birmingham and the Black Country.
3. Describe a railway journey by the London and North-Western line from London to Chester.



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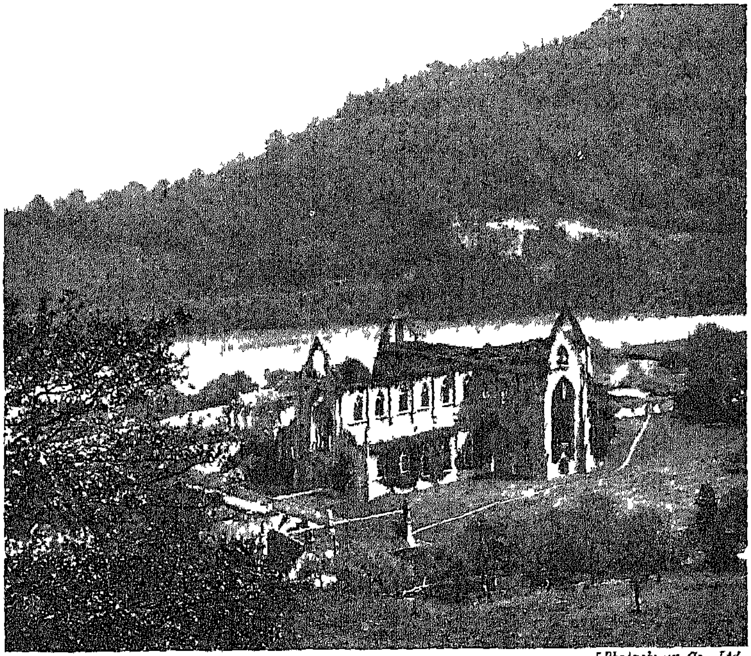
Curve of the Wye near Chepstow



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Tintern Abbey

THE BASIN OF THE WASH.

The Witham, Welland, Nen, and Great Ouse flow into the Wash, and all, save the Witham, have a north-easterly course parallel with the oolitic and chalk escarpments. On account of the flatness of the surface the sluggish rivers have had to be confined by high artificial banks to prevent their overflowing. The Witham has to break through the northern continuation of the oolitic rocks, and Lincoln, which has a fine cathedral, arose around a castle placed on a commanding height above the river, the site of a Roman colony which guarded this gap.

The rivers traverse a district which becomes flatter and flatter towards the marshy shores of the shallow Wash, a great inlet which is gradually being silted up. The sand brought in by the tide tends to fall at slack of high water, thus, in time, creating sand-banks along the shores, while samphire and other plants and grasses gradually grow over the marshes and sand-hills, and, binding the soil together, prevent its being swept away by the tide.

The district round the Wash is called the Fens, and part of it Holland. Originally much of this area, especially after heavy rains, must have been a shallow sea, dotted with islands, and one of them, named Ely, formed a retreat for Hereward the Wake in the time of William the Conqueror. Later some monks settled on Ely, and built a beautiful cathedral, while another island became the site of the cathedral of Peterborough. These places are no longer islands, but rise on the banks of the Ouse and the Nen respectively from the midst of a rich agricultural area, part of which is called the Bedford Level, on account of the draining of the land by the Earls of Bedford in the seventeenth century.

Most of the Fen district has, in fact, now been reclaimed and enclosed, though a few patches, haunted by numerous water-fowl, recall what was formerly the typical scenery of the whole area. Lord Avebury, in his book on 'The Scenery of England,' writes: 'Unpicturesque as the Fens may appear to some, they possess a beauty and mystery of their own. Those who know them love them; they delight in the low rows of trees, the occasional windmills, the wide expanses which give a sense of space and freedom, the calm sheets of water fringed with tall reeds and sedges and grasses, and the beautiful atmospheric effects.'

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ELY CATHEDRAL.

Owing to the fertility of the soil, the suitable climate, and the absence of coal, the main occupation in the counties of Lincoln, Rutland, Northampton, Huntingdon, Bedford, and Cambridge are agricultural and pastoral. Peas, beans, potatoes, and turnips are largely grown for the London market, as well as cereals, while such industries as exist in the chief towns are based on the requirements or products of these occupations. Lincoln and Bedford, for example, make agricultural implements, Northampton and other towns in the same county make leather and manufacture boots and shoes, while Luton and other towns in Bedfordshire are engaged in the straw-plait industry. Cambridge, situated on the banks of the Cam, a tributary of the Great Ouse, is the seat of a great University, enriched largely by agricultural endowments. The numerous fine college buildings raise the small market town to importance, and the beauty of the college gardens and grounds, which stretch to the river and are called 'the Backs,' has long been famous.

The chalk hills which traverse Lincolnshire are called the Wolds, and resemble those of Yorkshire. Grimsby, at the entrance of the

Humber, is a great fishing centre, and sends out many ships to the Dogger Banks.

SUGGESTIONS.

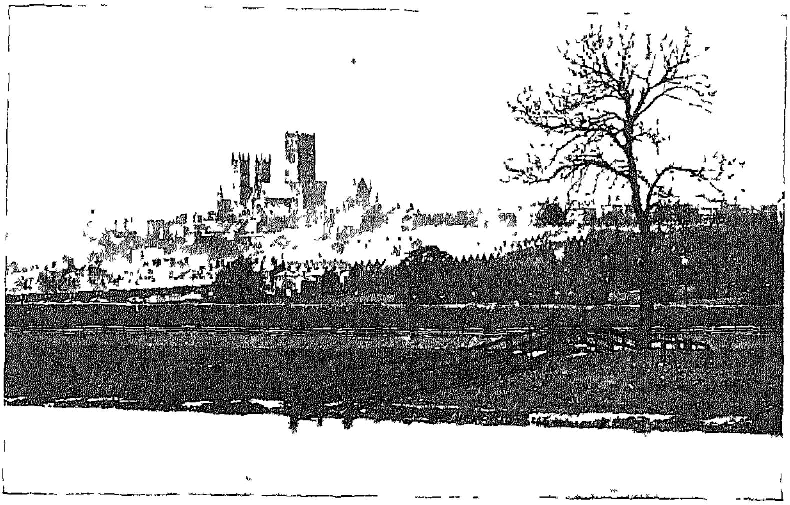
1. Draw a map of the basin of the Great Ouse, inserting the places named.
2. Tennyson spent the first part of his life in Lincolnshire. Try to find descriptions of Fen scenery or plants in the 'Lady of Shalott,' the 'May Queen,' and the 'Dying Swan.'
3. Describe a railway journey from London to York by the Great Northern, mentioning the chief towns passed through and the rivers crossed, and giving some account of the geological structure of the country passed over.
4. Account for the fact that the basin of the Wash enjoys a slight rainfall compared with the rest of England (see p. 25), and a relatively high temperature in July (see p. 21), and state the effect of this fact on agriculture, and on the occupations of the inhabitants of this area.

EAST ANGLIA.

The counties of Norfolk, Suffolk, and Essex consist partly of the chalk East Anglian Heights, which resemble the Wolds, and partly of clays, gravels, and sand. The soil is well suited for wheat and barley, as well as for the poppies which brighten the fields in summer. The chief towns are market centres—*e.g.*, Chelmsford and Bury St. Edmunds—but Ipswich manufactures agricultural implements and Norwich mustard, starch, and boots and shoes. Norwich has a castle and cathedral, and was once a port, but the Yare, like some other rivers in this district, has been largely silted up.

The silting up of the river-mouths and the flatness of the land has caused fresh water to collect in shallow pools and marshes called the 'Broads.' These lakes, and the network of connecting rivers, are bordered, and sometimes overgrown, with bulrushes, tall reeds, and water-plants. They abound in fish and water-fowl, and form pleasant holiday resorts for boating in summer.

Four miles off the coast of Norfolk, near Yarmouth, the sea-currents have created a large sand-bank, and the water between this and the mainland is called the Yarmouth Roads. Yarmouth is a great fishing centre, especially noted for smoked herrings, called 'bloaters.' Of the other places along the coast, some are seaside resorts—*e.g.*, Cromer—but Harwich has become an important packet station for the Continent, with a large artificial harbour, and Colchester is noted for the oyster-beds in the river Colne. The large shallow estuaries of the Stour, Colne,



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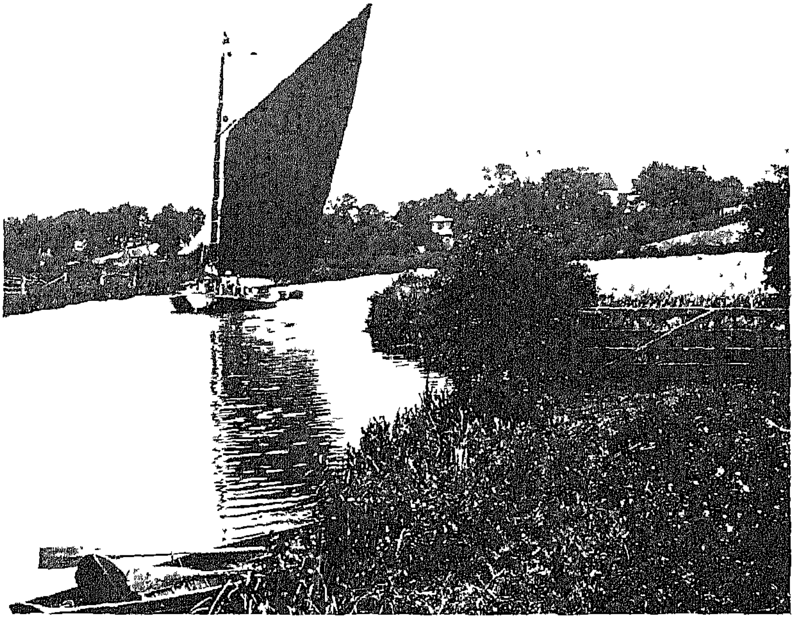
LINCOLN, TAKEN FROM THE SOUTH-EAST.

Notice how well the city is built on the ground rising up from the river Witham to the site of the beautiful cathedral.



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AMONG THE NORFOLK BROADS.

A typical scene on one of the rivers connecting the Broads and Blackwater are a marked feature of the southern coast. Though in some places the sea is creating land, in parts of Suffolk it is destroying it so rapidly that the sites of once-famous towns now lie under the water.

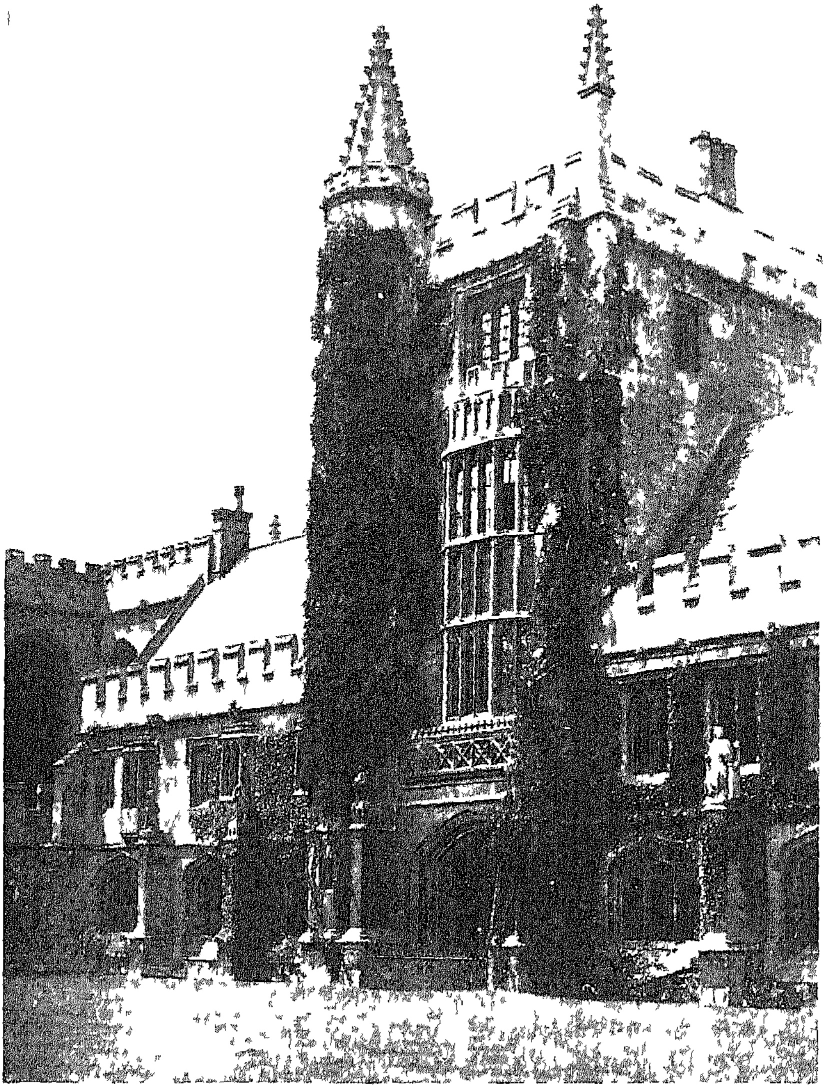
QUESTIONS AND SUGGESTIONS.

1. Can you think of any historical reasons for a woollen industry which once flourished in Norfolk? Why has it declined in modern times?
2. Describe a railway journey from London to Yarmouth, mentioning the rivers crossed and towns passed through.
3. Why is this region called 'East Anglia'?
4. Draw a map of the shores of the North Sea south of 55° N., and indicate the chief ports along the east coast of England, and those of Hamburg, Bremen, Amsterdam, Rotterdam. and Antwerp, with all of which we carry on a large trade, on the Continent. Mark also the packet stations of the Hook of Holland, Flushing, and Ostend, and the mouths of all important rivers which form routes into the countries along these shores.

THE THAMES BASIN.

The Thames rises in the Cotswolds, and flows down the gradual eastward slope of the oolitic rocks until, at Oxford, it receives the Cherwell, flowing southwards. Here it changes its easterly for a southerly course, and breaks through the chalk hills, thus separating the Chilterns from the Marlborough Downs. At Reading the Kennet joins it, flowing eastwards, and the Thames, changing its course again, flows east through a valley of increasing breadth, across the clays and gravels which form the fertile soil of most of its lower basin. On the south it receives the Wey, Mole, and Medway, which have cut their valleys through the North Downs, and from the north the Colne and Lea.

The Thames is about 210 miles long, navigable throughout the greater part of its course, and connected by canals with the Severn and the Midlands. Its wide and, at high water, deep estuary, situated almost opposite the mouths of the Rhine and the Scheldt on the Continent, is in a good position for trade. The river has always been a very important waterway leading into the heart of the country, and London on its banks has become the greatest city in the world. It forms a county boundary throughout the greater part of its course, probably because the remains of the Roman fortifications of London were sufficient to prevent the invaders from at first sailing up the Thames, and thus they were forced to approach it from the north-east and south, forming settle-



MAGDALEN COLLEGE, OXFORD

This view shows the tower at the entrance to an enclosure surrounded by college buildings, called a 'quadrangle The college chapel is at the extreme left of the picture.

ments *en route* which much later became the nuclei of county organizations (see Chapter XIII. in 'Britain and the British Seas').

Several old towns of historic note are situated in the Thames basin. Oxford stands at the river-bend, amidst the rich agricultural lands which have helped to endow its beautiful University colleges. Many of these have lovely gardens, while the Thames and Cherwell afford delightful opportunities for boating. The royal residence of Windsor Castle is situated in pretty scenery and conveniently near London. Eton, near by, is noted for its public school. St. Albans is a quaint old town in Hertfordshire with a beautiful cathedral.

The absence of coal and the overwhelming attraction of London have not favoured the rise of large industrial places in the district far from the Metropolitan area, and such industries as exist are based on agriculture—*e.g.*, the biscuits and seeds at Reading, cakes at Banbury in Oxfordshire, dairy produce at Aylesbury in Buckinghamshire, and lavender scent at Hitchin in Hertfordshire.

SUGGESTION.

Make a map of the Thames basin, and fill in the tributaries and places mentioned, and the counties it divides.

LONDON.

London arose on the Thames at the head of ocean navigation, and at the lowest point where the Romans found the river could be easily forded and bridged. Thus roads were early constructed radiating in all directions over the country from it: the place became a great distributing centre, and the heart of the city still lies in the angle between the Thames and the Lea, where, near London Bridge, are to be seen the Bank, Royal Exchange, Tower, and St. Paul's Cathedral. Westwards a road, still called the Strand, though on account of the modern Embankment no longer at the water's edge, ran along the shore of the Thames to Westminster, where the Houses of Parliament, the beautiful Abbey, and the palace of Whitehall were built in course of time.

Towards the north and west of the city important residential quarters have gradually arisen, where art and literature can be studied at the National Gallery and the British and South Kensington Museums, and where the University of London also has its offices. Regent's Park, noted for its Zoological Gardens, and other large open spaces lie in this part of London, and promote the health and pleasure of the inhabitants.

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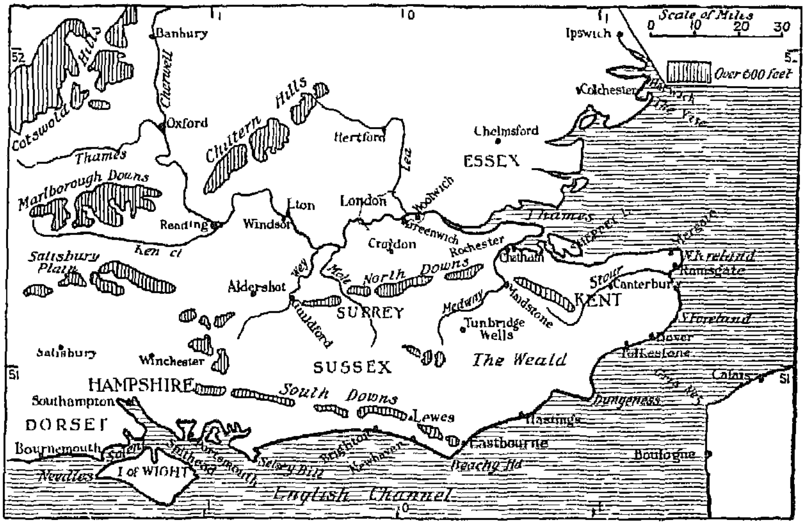
WINDSOR CASTLE AND THE THAMES.



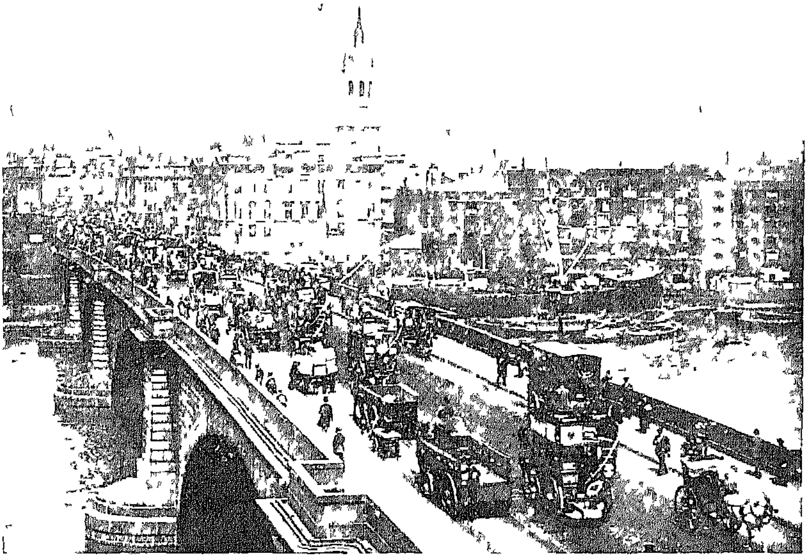
SOUTH-EASTERN ENGLAND: PHYSICAL AND POLITICAL.

The Thames did not long prove a barrier to the extension of the city, and south of the river, as well as in East London, various industries have sprung up to supply the needs of the great community—*e.g.*, sugar-refining, and the manufacture of jam, soap, matches, leather, candles, cement, etc. The enormous local demand, especially of food products, also necessitates a large import trade, which facilities for redistribution by rail has further fostered. Great docks have been made along the river banks, and the Port of London technically includes Tilbury, Gravesend, and Queenborough on Sheppey Island, as well as docks nearer London. London receives about one-third of the value of the total imports of the country, and sends out over a quarter of the value of the total exports. It has almost a monopoly in the import of tea, other large imports being wool, mutton, coffee, spices, and potatoes.

Around London there is a ring of important suburbs, which are now so closely connected with the City, where most of the men do business, that, with it, they are considered to form Greater London. This, roughly, extends over an area within fourteen miles of Charing Cross, including places like Croydon in Surrey and West Ham in Essex, and has a total population of over seven millions. West of London, on the Thames, are Kew, with its famous Botanical Gardens, and Brentford, county town of Middlesex, while east of it lie Greenwich, which sets the time for Britain, and Woolwich, with its great Arsenal. To the north and south are isolated hills, generally capped with gravel, which form pleasant patches of open country and healthy sites for towns—*e.g.*, Sydenham, where the Crystal Palace is situated, Richmond, Hampstead by the Heath, and, farther west, Harrow, noted for its public school, while east of the Lea is Epping Forest.

SUGGESTIONS.

1. Get a plan of London, and find out the sites of the chief buildings, parks, and docks.
2. Describe a steamer trip on the Thames from Hampton Court to London Bridge.
3. Point out some of the differences in the trade of the following ports: London, Liverpool, Glasgow, and Cardiff, and account for them as far as possible.
4. Find out from the 'Statesman's Year-Book' the amount of tonnage entered and cleared at New York, Genoa, Marseilles, and Rotterdam, and compare the results with that of London.



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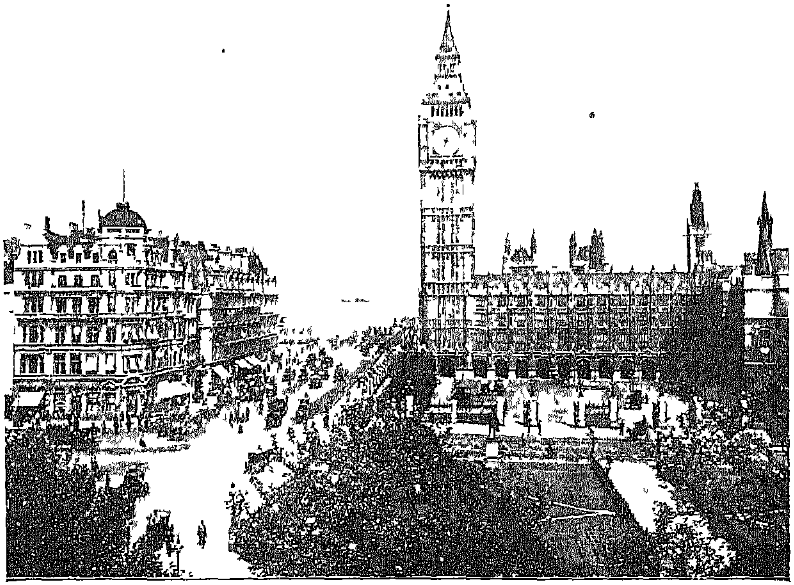
London Bridge.

Notice the Monument which was built to commemorate the Great Fire in 1666



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SOUTH-EAST ENGLAND.

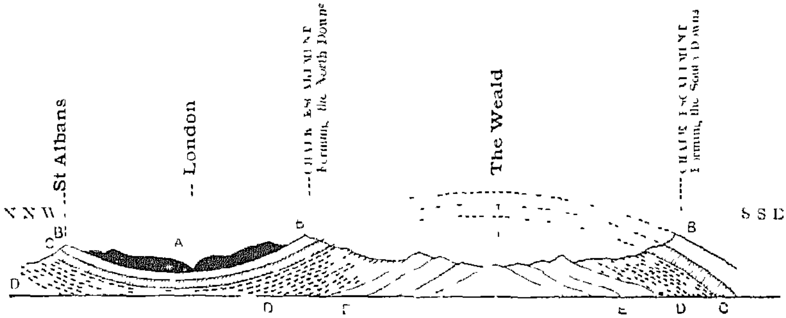
The strategic and commercial importance of this area is due to its intermediate position between the Continent and London, while its proximity to the latter, its fine coast and natural agricultural advantages of climate and soil, have made it the playground and garden of the great Metropolis. It is crossed by many railways radiating from London and terminating in the various seaside resorts and packet stations along the coast (see p. 7).

The prevailing rock is chalk ; in fact, originally the whole of South-East England must have been covered with chalk, and have then been uplifted along a central axis running east and west, so that rivers rising in the higher central belt would naturally flow northwards to the Thames or southwards to the Channel. Afterwards the central part of the arch, being particularly exposed to the action of the weather, was eroded, exposing the rocks underneath the chalk in the east, and completely separating the chalk area which forms the North Downs from that called the South Downs. In the diagram on the opposite page you will notice the gradual slope of the North Downs on the north and the steep escarpment on the south, and the reverse with the South Downs. You will also see how the chalk of the North Downs dips under the London basin, where it has been reached by boring, and reappears north of this area in the Chiltern Hills (see also p. 14).

The gently rounded surfaces of the Downs are mainly covered with grass, and devoted to sheep rearing. Like the Wolds, they are intersected in parts by dry valleys, since water soon soaks through the porous soil. The North Downs broaden out towards the sea, and form white cliffs along the coast from Deal past the South Foreland and Dover, the packet station for Calais, to Folkestone, the packet station for Boulogne. The Isle of Thanet, as it is called, though it is no longer an island, also consists of chalk, which is separated from the North Downs by the marshes of the Stour, so that there are chalk cliffs also at the North Foreland and at the watering-places of Margate and Ramsgate.

The South Downs terminate in the chalk cliffs of Beachy Head, and along the sheltered south coast at the foot of the Downs are the fashionable watering-places of Brighton and Eastbourne.

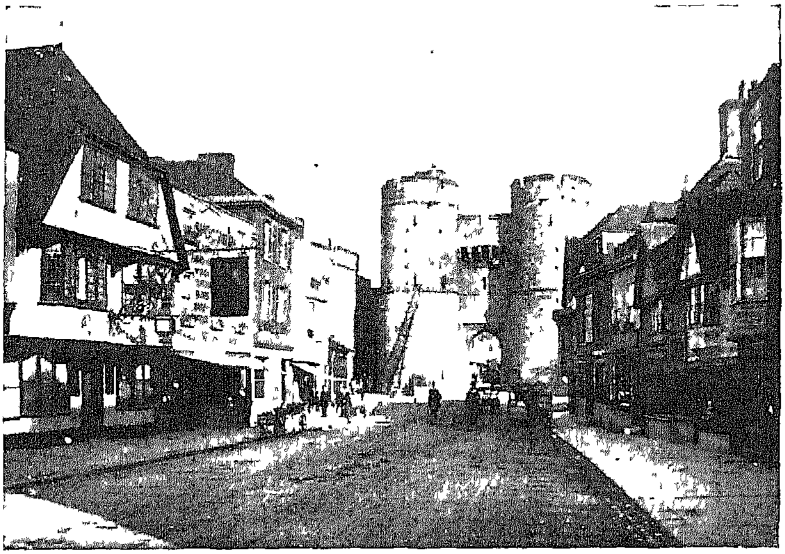
While the central part of the original upfold of chalk was being lowered by erosion, the rivers had to deepen their valleys across the Downs in order to maintain their general north and south directions, and the gaps thus formed have a strategic and commercial value. In the north


N N W
St Albans
London
CHALK ESCARPMENT forming the North Downs
The Weald
CHALK ESCARPMENT forming the South Downs
S S E
A
B
B
B
C
C
D
D
D
E
E

SECTION ACROSS S.E ENGLAND.

A = London clay.
BB = Chalk.
CC = Lower Greensand.
DD = Weald clay mainly.
EE = Hastings sand

The dotted lines indicate the original upfold of the rocks before erosion took place.



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THE WEST GATE, CANTERBURY (taken from without).

Formerly all the six roads which led into the city were guarded by such gateways as this, but none of the others are now existing. This one was rebuilt on the site of a Norman one in the reign of Richard II.

Guildford, the capital of Surrey, guards the gap of the Wey tributary of the Thames; and Maidstone, capital of Kent, that of the Medway; and Rochester and Chatham, at the mouth of the Medway, and Canterbury, on the Stour, mark the northern entrances to these valley routes. There is a cathedral at Rochester, and a more famous one at Canterbury, which is the seat of an archbishopric.* Chatham, and Sheerness on Sheppey Island, are great arsenals.

In the south Lewes, the capital of Sussex, stands on the Ouse, where it has cut through the South Downs, and Newhaven, the packet station for Dieppe, is at the mouth. Farther west Arundel stands on the Arun, and the cathedral city of Chichester guards a now dry valley beyond the promontory called Selsey Bill.

Between the North and South Downs lies the diversified tract of land called the Weald. It consists of clay, sand, and sandstone, the last-named forming the central heights. Formerly the region was covered with forests, as the name, like the German word 'Wald,' indicates; and though these have been largely cut down, remnants still exist. The district is now mainly a rich agricultural area, where hops, cherries, and plums are largely grown. Tunbridge Wells is a favourite inland resort noted for its medicinal waters.

The sandstone of the Weald forms cliffs near the watering-places of Hastings and St. Leonard's, but otherwise the coast-line is generally low between Hythe and Pevensey—places which have lost their former importance through the silting-up of their harbours. Hythe was one of the old cinque (five) ports for the defence of this part of the country which lies so near to the Continent, the others being Sandwich, Dover, Romney, and Hastings. Dover alone retains importance, owing to the creation of a large artificial harbour, and to its situation at the termination of the shortest route from the Continent. Dungeness promontory is a mass of shingle deposited by tidal currents, and near Romney there is still an extensive marsh, though part of it has been reclaimed.

QUESTION AND SUGGESTIONS.

1. Draw a map of Kent, indicating features and places named.
2. Read Lord Avebury's description of the Downs in 'The Scenery of England,' Chapter XIV.
3. Where are the Goodwin Sands?

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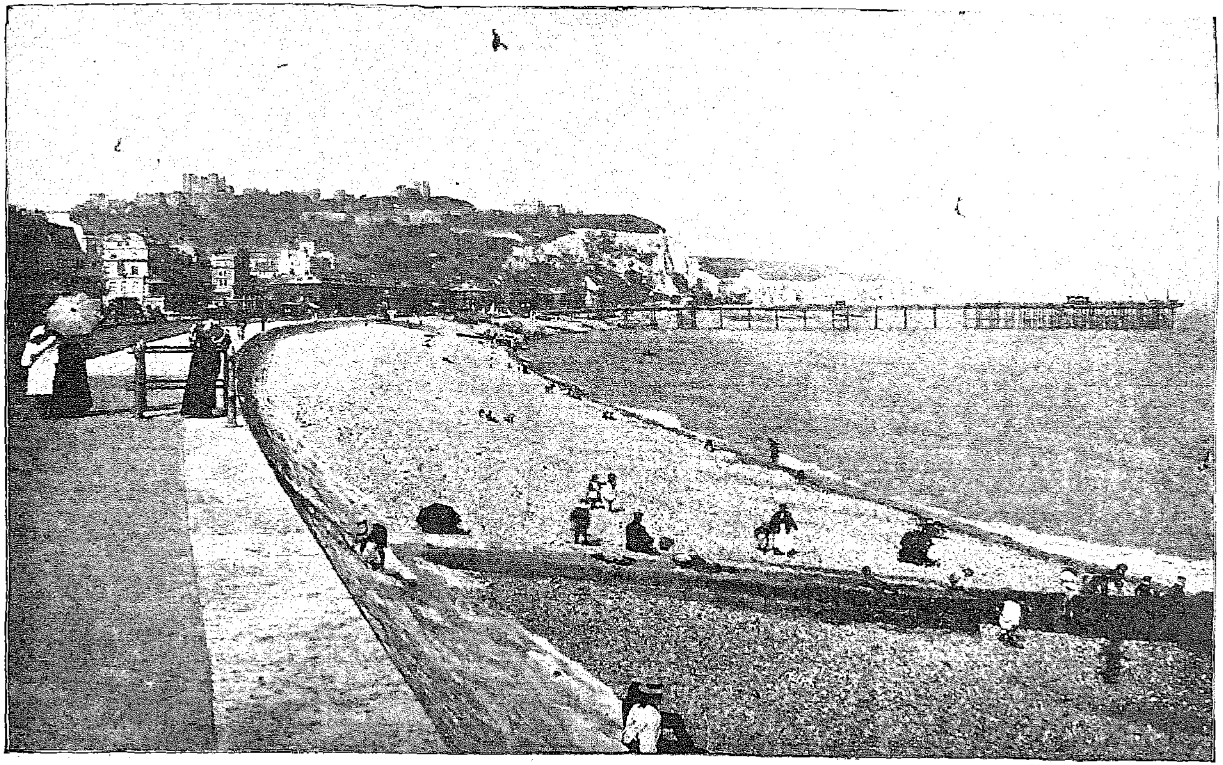
* On account of the murder of Thomas à Becket in Canterbury Cathedral, it became customary in the Middle Ages to make pilgrimages to his shrine there, a practice immortalized by Chaucer in his 'Canterbury Tales.'



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DOVER.

Notice the chalk cliffs and the castle on the hill to the left of the picture.

THE SOUTH-COAST RIVER BASINS.

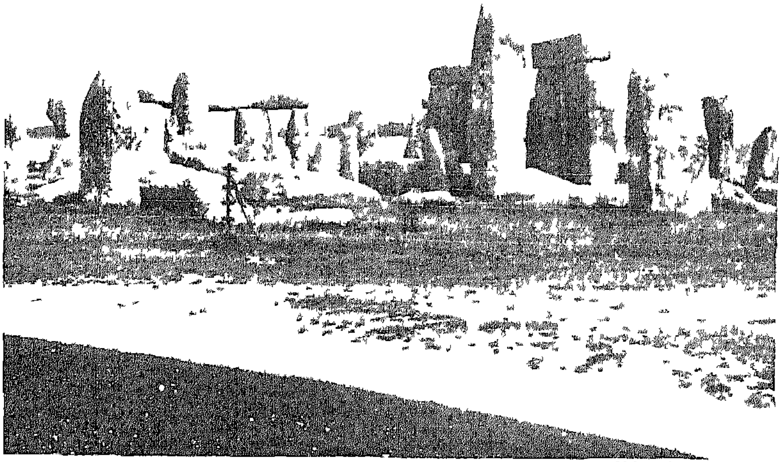
From the chalk upland of Salisbury Plain ranges diverge north-eastwards and eastwards (*e.g.*, the Marlborough Downs and North Downs), enclosing the lower basin of the Thames, and south-eastwards (*e.g.*, the South Downs) and southwards, enclosing the fertile clays and gravels of the Hampshire basin (see p. 13). Chalk is also found in the south part of the Isle of Wight, and forms the stacks called the Needles (see p. 17). The chalk area, saving the Chiltern Hills, is for the most part treeless, and supports a large number of sheep. Its open character favoured early settlement, as is shown by the remains of the stone circles at Stonehenge; but it is now only sparsely peopled, and is therefore, like the heath-clad common of Aldershot, often used for military manœuvres.

The town of Salisbury, noted for its graceful cathedral spire, stands on the Avon, where several streams unite after leaving the chalk plateau. Winchester, on the Itchen, once the capital of England, and Dorchester on the Frome, are also situated where the rivers leave the chalk. Between Salisbury plain and the Marlborough Downs there is a depression known as the Vale of Pewsey, and Devizes commands this natural line of traffic. Swindon is a great railway centre on the Great Western line north of the Marlborough Downs. This part of Wiltshire is famous for pigs, and bacon is cured at Devizes.

The chalk area is bounded on the west by the oolitic rocks, which form the shelly limestone cliffs of the West Dorset coast. Portland Island is a mass of limestone, joined to the mainland by the shingle of Chesil Beach. On the island is a great prison, and the convicts are largely employed in quarrying the limestone. Weymouth, a packet station to the Channel Isles and France, and a seaside resort, enjoys a harbour well sheltered by Portland Bill.

Between St. Alban's Head, on the so-called Island of Purbeck, where marble is quarried, and Selsey Bill the coast is low, and is broken by large estuaries which form Poole Harbour, Southampton Water, and Portsmouth Harbour. Southampton has the advantage of four tides every twenty-four hours, and is the chief commercial port on the south coast, while Portsmouth is a great naval station.

Between Southampton Water and the Avon is the New Forest, which is said to have been originally planted for hunting purposes by



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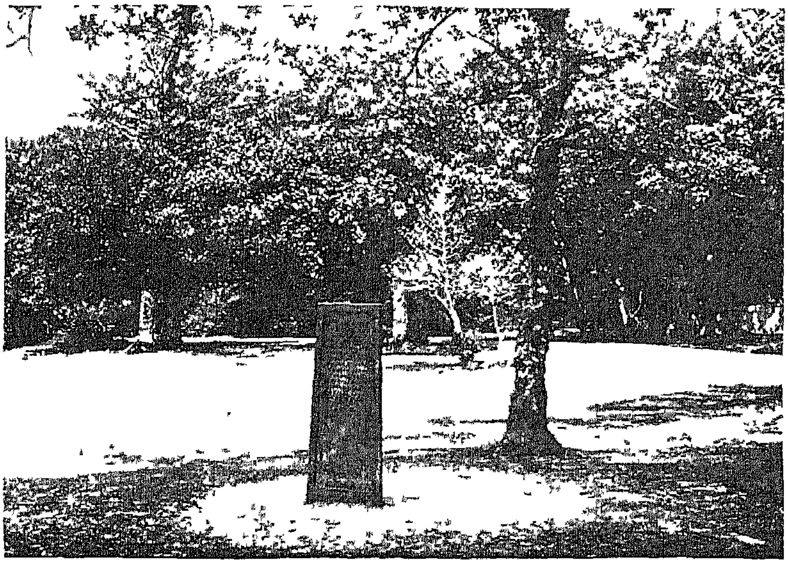
STONEHENGE



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THE NEW FOREST.

The stone is said to mark the spot where William II. fell by Walter Tyrell's arrow.

William the Conqueror. The forest consists largely of oak-trees, and is in parts very dense, but there are also open stretches of heath and large tracts of greensward simply dotted with trees. A hardy breed of ponies run wild in the district. Owing to the mildness of its climate, Bournemouth, like Cowes and other places in the Isle of Wight, is a noted winter resort. The Isle of Wight, which is separated from the mainland by Solent and Spithead, has been called the 'Garden of England,' on account of the luxuriance of its vegetation due to climate and soil.

QUESTIONS AND SUGGESTIONS.

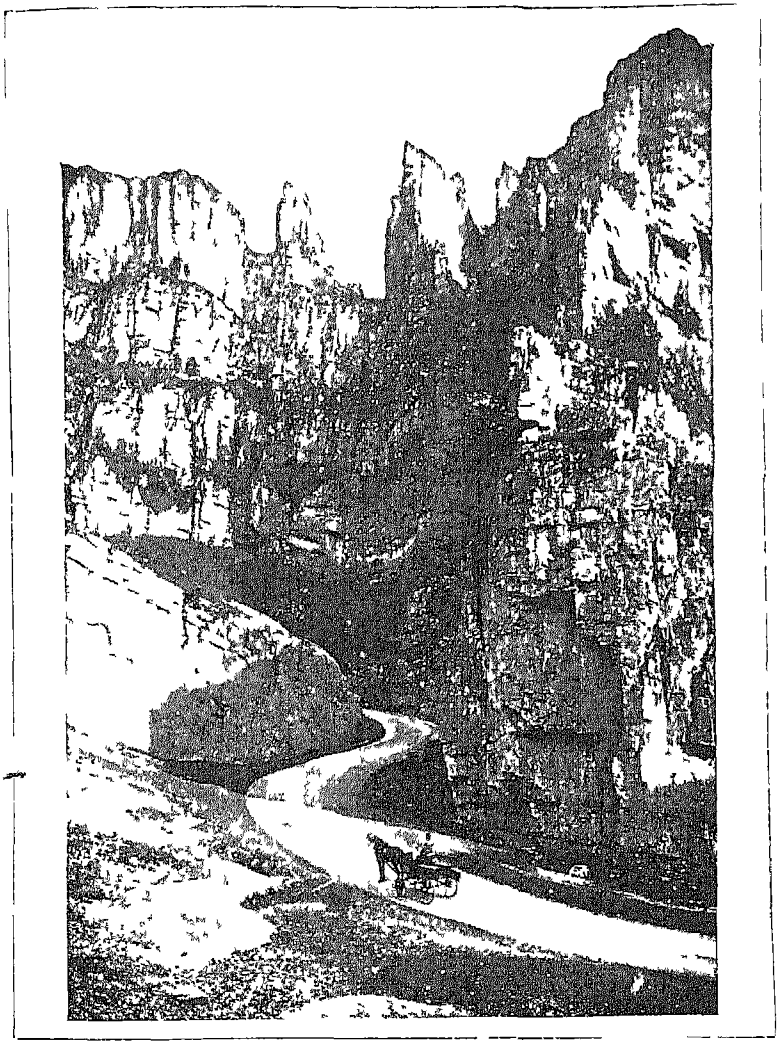
1. It is an advantage to a port when there is a good supply of coal in the vicinity. Which of the chief ports of Great Britain have this advantage, and from what sources might we expect the others to be supplied?
2. Draw a sketch-map to show the distribution of chalk in England, and describe the characteristic scenery of this area. Why are the occupations of the people in this area agricultural and pastoral, and not, to any important extent, manufacturing?

SOUTH-WEST ENGLAND.

This peninsula, on account of the upland nature of the surface and its distance from the routes naturally taken by invaders from the Continent, remained longer than other parts of England the home of a pre-eminently Celtic population, and was hence long known as West Wales. It was only at the close of the eighteenth century that a distinct Celtic language completely died out in Cornwall, while throughout the area Celtic influences are traceable in the names of places, relics of the past, and local legends. The area consists mainly of old rocks, which form a series of upland moors partially separating the depressions of river basins.

The greater part of Somerset is the basin of the Parret—a low, flat district between the Mendips and the Quantocks, which are an outlying part of Exmoor. This region must have been a shallow sea studded with islands and bordered by extensive marshes in the days when King Alfred took refuge at Athelney. In spite of much that has been done by drainage to reclaim the land for agriculture, bogs still exist, and peat is cut for fuel on Sedgemoor and elsewhere. Orchards abound in the fertile areas, most of the apples being used for cider. The shores around Bridgwater Bay consist chiefly of blown sand-hills.

Most of the towns in Somerset are small agricultural centres; Taunton,



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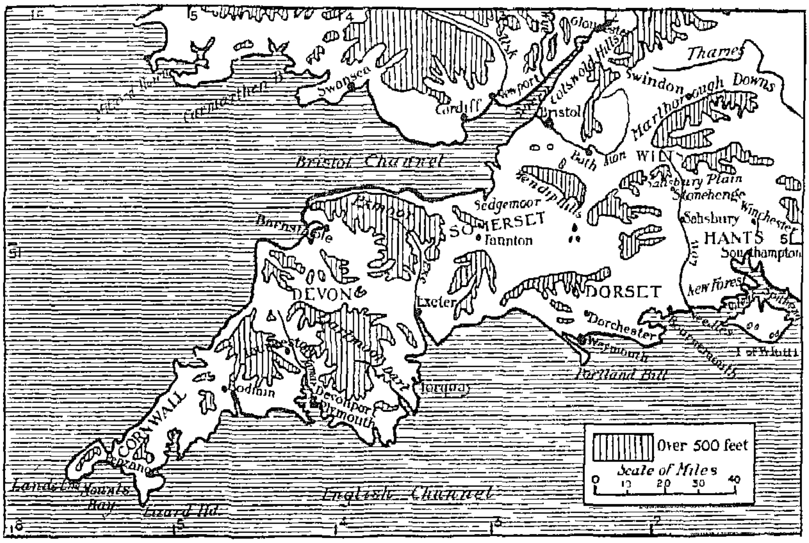
CHEDDAR GORGE IN THE MENDIP HILLS

This gorge is probably partly due to stream erosion and partly to the falling in of the roofs of former caves. A tributary of the Axe, which now flows underground, issues forth at the lower entrance to the gorge. In places the rocky pinnacles assume the aspect of embattled towers, and the grand scenery and interesting caves attract many visitors in summer the county town, commands the natural south-west route into Devonshire; Yeovil, in the south, manufactures gloves, Bridgwater makes bricks; the little city of Wells, with its beautiful cathedral and the ruined abbey of Glastonbury, stand amid the rich pastures at the foot of the Mendips. The cattle raised on the Mendip slopes account for the cheese made around Cheddar. This little place is situated at the entrance of a famous gorge in the Mendips, where the limestone forms precipitous cliffs, and water, which has filtered through the rock, has hollowed out vast caverns and decked them with stalactites (see p. 69). Weston-super-Mare and Clevedon are growing seaside resorts, and steamers ply regularly in summer between the former and Cardiff and Bristol. The little islands of Steep Holme and Flat Holme in the Bristol Channel are probably remnants of a former continuation of the Mendips.

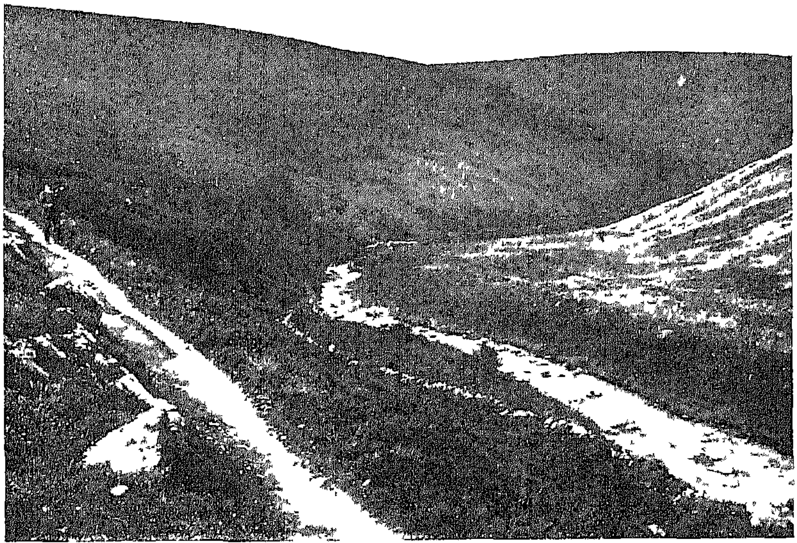
The district in North-West Somerset and North-East Devon is occupied by the old red sandstone plateau of Exmoor. This is a treeless region covered with heather, bracken, and coarse grass, where the red deer still runs wild, and hardy breeds of sheep and ponies are reared. Part of it is an uninhabitable boggy waste, but its seaward front is broken by deep picturesque valleys, called combes, and the red rocky coast from Minehead to the large seaside resort of Ilfracombe is remarkably fine. On its inland side there are many beautiful cultivated valleys.

Exmoor is separated from Dartmoor, in South Devon, by a belt of undulating country, which extends from Barnstaple Bay to the English Channel, and includes the valleys of the Taw and the Exe. The southern part of this area consists of the new red sandstone that forms picturesque cliffs at the mouth of the Exe—*e.g.*, at Dawlish. The lovely scenery and mild climate of the south coast have encouraged the rise of health resorts, of which Torquay is the largest, while the rich pasturage of the interior accounts for the noted dairy produce of Devon. Exeter, which possesses a cathedral, stands at the head of the estuary of the Exe, and Barnstaple in a like position on the Taw.

Dartmoor is treeless save in the valleys, but the surface is diversified by bosses of granite called 'tors,' and, on account of the granite decomposing into clay, the district abounds in dangerous bogs, which render the place suitable for a convict station, as escape is difficult. Some of the clay, called 'kaolin,' is sent to the Staffordshire potteries for making china. Several small streams rise on Dartmoor, one of which—



SOUTH-WESTERN ENGLAND: PHYSICAL AND POLITICAL.



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THE DOONE VALLEY IN THE NORTH OF EXMOOR.

This district is associated with Blackmore's novel entitled 'Lorna Doone.'

the Dart—is very famous for its beauty, and for the Elizabethan heroes who lived on its banks.

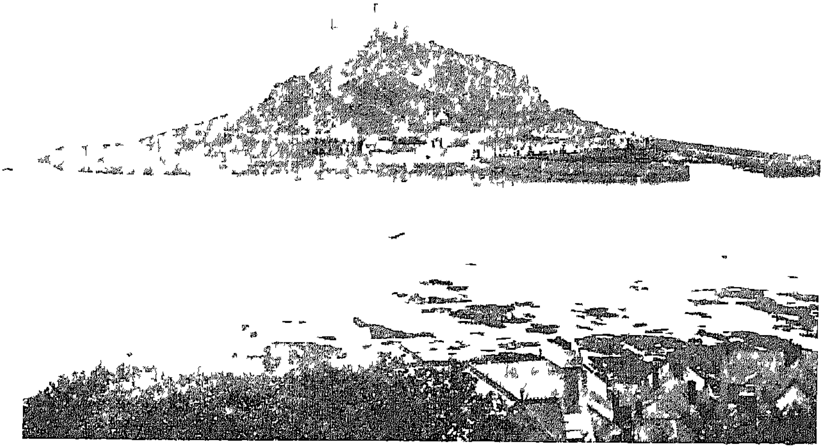
The rugged coast of South Devon and Cornwall shows signs of former subsidence in the fjord-like nature of its inlets, and Plymouth Sound, protected by an artificial breakwater, forms a magnificent harbour, now the headquarters of the British fleet. The estuary of the Tamar is guarded by the 'three towns' of Plymouth, Devonport, and Stonehouse. Opposite the estuary, and out at sea, stands the famous Eddystone lighthouse.

The Tamar divides Devon from Cornwall, and Dartmoor from other high granitic moorlands, which occur in places throughout the peninsula, and terminate in the striking cliffs of Land's End. The Lizard is composed of a rarer rock called 'serpentine,' of great ornamental value. The heathery Cornish moors are ill-suited for agriculture, and the inhabitants find employment in quarrying granite, tin-mining, and largely in the pilchard and mackerel fishing around the coast. The chief inland towns are Launceston, the capital, Bodmin, and Liskeard, while the cathedral city of Truro stands at the head of a very beautiful estuary, the entrance to which is commanded by Falmouth. The grand coast scenery and extraordinarily mild climate, which permits of almost subtropical vegetation in the sheltered valleys, attracts a number of visitors and artists to Falmouth, St. Ives, Penzance, and other places. St. Michael's Mount is a granite rock in Mount's Bay, not far from Penzance. It is connected to the little town of Marazion by a causeway formed of rocks and pebbles, passable only at low tide. The castle on its summit dates from 1047.

The Scilly Isles, which lie west of Land's End, grow flowers and early vegetables for the London market.

QUESTIONS AND SUGGESTIONS.

1. Describe a railway journey from Bristol, viâ Taunton, to Penzance, and illustrate by a sketch-map showing how the line has avoided the upland regions, and what rivers it has to cross.
2. What regions in the South-West of England will be least densely populated, and why?
3. Write a geographical description of Cornwall.
4. Describe the situations of the naval stations in England, and mention any causes which have probably helped to determine their positions.
5. There is a splendid natural harbour at Falmouth. Can you think of any reasons why the town is not more important as a port now than it is?



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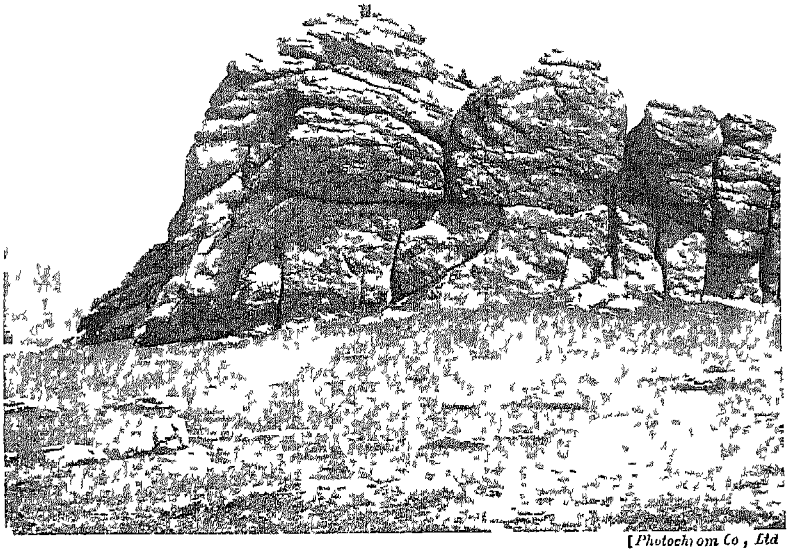
ST MICHAEL'S MOUNT AND MARAZION

The Mount is about a mile in circumference and 250 feet high.



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HEY TOR, DARTMOOR

WALES.

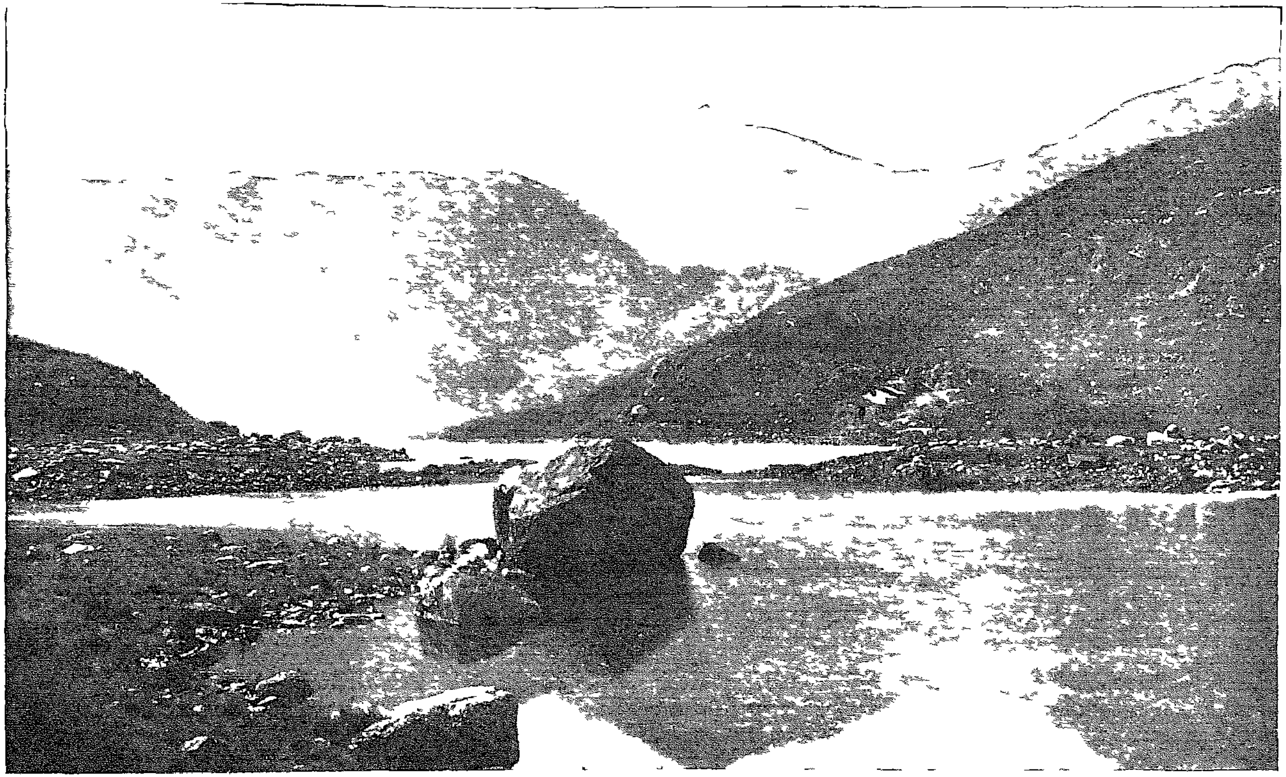
Most of the Welsh mountains, like those of the Highlands, have been formed by the erosion of an original plateau, hence the comparatively uniform altitude of much of the higher ground. These mountains, which form a roughly rectangular upland region, consist of very old rocks. The oldest rocks occur in the projecting counties of Carnarvon and Pembroke, while in the south there exists a great coal-field and a small one in the north-east (see p. 13). The greater part of the interior of the country is unsuitable for agriculture, and is devoted to the rearing of cattle and sheep (see p. 27). Population is concentrated on the coal-fields, along the fertile coastal belts in the north and south, and in the river valleys (see p. 29).

The fact that the valleys of the Dee, Severn, and Wye open out into English plains before reaching the sea, and unite with the coastal belts of the north and south, has facilitated the invasion of Wales, and has tended to connect North Wales with the district round Liverpool, and South Wales with that round Bristol. These connections, which have now been emphasized by the construction of railways, partly account for certain shades of difference in the inhabitants of North and South Wales respectively. The central uplands of the interior of Wales have, moreover, rendered direct communication between these parts difficult.

As Mr. Owen M. Edwards has stated in the first chapter of his book on Wales: 'A glance at the map shows that Wales is difficult to conquer. . . . The same glance shows that Wales is ill-adapted for union. Its valleys are separated from each other by high and pathless mountains; they open out on the sea of the west, or on the plain of the east. There is no central point upon which paths and roads could converge; Wales never had a capital. . . . But if the mountains of Wales made political union difficult, they gave their inhabitants the same characteristics and community of ideas and of aims centuries before combined action became possible.'

Though the national costume has been practically abandoned, it was estimated in 1911 that Welsh was the only language of 7·9 per cent. of the population, while 32·5 per cent. were bilingual. The national love of literature and music is shown by the competitions held at the Eisteddfodau meetings, and the choral singing of the Welsh choirs has become famous. The country possesses a University composed of three colleges —Bangor in the north, Aberystwyth in the west, and Cardiff in the south.

Wales naturally falls into the northern and southern regions.



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SNOWDON

The lake shown in front is Llyn Llydaw. On the right can be seen the path which leads from Pen y Gwyrd up the eastern side of Snowdon, which is about 3.500 feet high. Another path and a railway lead up the northern slope from Llanberis

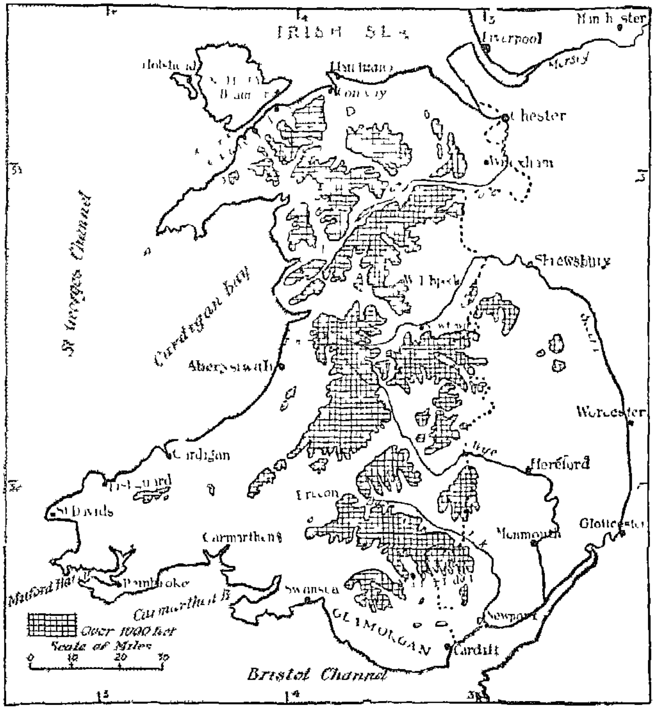
NORTH WALES.

The mountains of North Wales may be divided into various groups, of which the most important is that around Snowdon. Snowdon, the highest mountain in England and Wales—3,500 feet—is still far below the snow-line, and is usually only covered with patches of snow in winter. It is chiefly formed of a mass of hard, igneous rock, and similar rock stretches in bands through Carnarvon, forming the Lleyn peninsula. The mountains in this area are separated from those in the north-east by the deep valley of the beautiful river Conway, and are characterized by rugged precipices and wild passes. The grand pass of Llanberis (see p. 107) is followed by a road connecting the charming village of Bettws-y-coed, on the Conway, with Carnarvon. The pass is flanked by high, rugged cliffs of slatey rock, which, by their rounded though scratched surfaces in places, show clear signs of former glacial action.

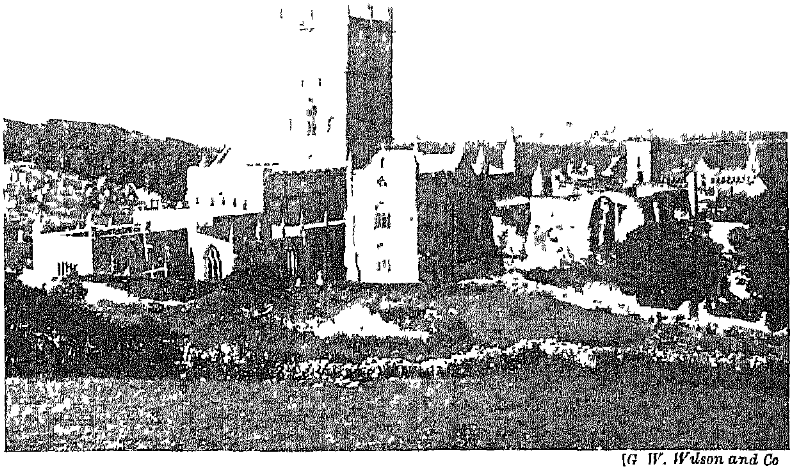
Slates are quarried at Llanberis, as well as at Penrhyn and Bethesda, both situated a few miles south of Bangor, besides at Festiniog and several other places in North Wales. In quarrying slates, the whole side of a hill is often hollowed out and cut into ledges, or terraces, till it resembles a vast amphitheatre (see p. 103). Thousands of men find employment in detaching, cleaving, and transporting the slates, which are often first rent from their rocky beds by blasting. The slates are mainly exported from Carnarvon, Bangor, and Portmadoc. The colour of the slate varies considerably from an occasional light-greenish hue to the common dark-purple shades.

In times of Welsh independence the district round Snowdon formed a natural stronghold for defence against invasion, but the people were obliged to rely for food-supplies on the fertile plains of Anglesey. To subdue the country, therefore, it was essential for invaders to obtain control of the Menai Straits. Carnarvon, which guards the southern entrance of the same, was fortified by Edward I., who built a castle there, and so, too, was Beaumaris, in Anglesey. Bangor commands the northern entrance of the straits, which are here crossed by a suspension-bridge and by a tubular-bridge, which is followed by the London and North-Western Railway to Holyhead, where the mails start for Ireland. There is a cathedral at Bangor, as well as a university college.

The mountainous district in the north-east lies between the Conway, guarded by Conway Castle at its mouth, the Dee, and the Clwyd, which last flows through a fertile valley near Denbigh and past the little cathedral



WALES: PHYSICAL AND POLITICAL.



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ST. DAVID'S CATHEDRAL FROM THE NORTH-EAST.
On the extreme right of the view are shown the ruins of the Bishop's Palace.

town of St. Asaph. The district abounds in lonely glens, and is especially picturesque near the coast, where a precipitous hill of limestone forms the promontory of Great Orme's Head, which shelters the bay occupied by the popular resort, Llandudno. Farther eastwards along the coast, and near the mouth of the Clwyd, is another watering-place, Rhyl.

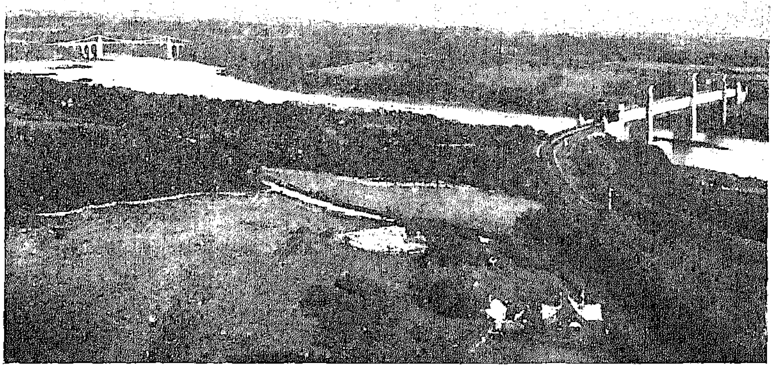
To the south-west of this district, and surrounded by grand mountains in Merionethshire, lies Lake Bala, the largest lake in Wales. The idea of a Bible Society originated at Bala, and here, too, Sunday-schools were first organized, while many eloquent preachers have been sent out from its theological colleges.

The Dee flows through Lake Bala, and then winds across a fertile valley till, at Corwen, it enters the picturesque Vale of Llangollen as a tumultuous stream. Later in its course it suddenly turns northwards, and reaches its wide estuary just beyond Chester. The left bank of the river is flanked by a range of hills in Flint, and by a coal-field which assists the iron, lead, and zinc works at and around Ruabon, Wrexham, and Holywell.

South of the Dee and Lake Bala lie the Berwyn Mountains, and between these and the sea rise the rampart-like ridges of Cader Idris, composed of igneous rock (see p. 105).

Dolgelly, a small town of gray stone houses, stands in the midst of a picturesque wooded district traversed by torrential streams, at the northern foot of Cader Idris and at the head of the Mawddach estuary. The fine stretches of sand at Barmouth, at the entrance to this inlet, and at Aberdovey and Aberystwith further south, cause these places to be popular summer resorts, while to the north lies Harlech Castle, finely situated on the top of a lofty rock. Aberystwith possesses a university college.

South of the Dovey rises the mountainous district of Plinlimmon, and from this region a belt of mountains covered with moors stretches round Cardigan Bay. Plinlimmon lacks the rugged grandeur of some of the Welsh mountains, but it forms the source of many rivers, including the Severn, Wye, Towy, and Teify. Sheep-farming is the chief occupation of the inhabitants throughout Central Wales, and the local supply of wool originated the Welsh flannel industry, largely carried on in the Upper Severn Valley at Welshpool and Newtown. An association has recently been formed to encourage certain industries in Wales which would otherwise have died out, such as hand-spinning and weaving of wool, and the manufacture of certain artistic kinds of pottery.



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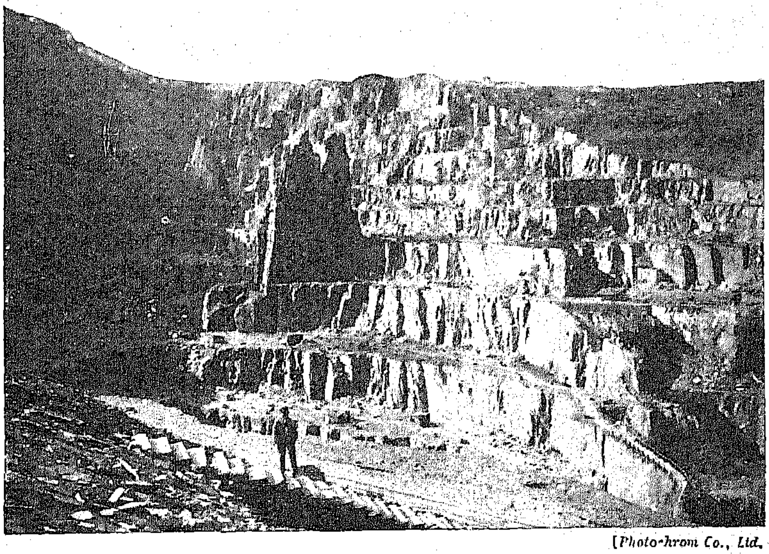
THE TUBULAR AND SUSPENSION BRIDGES OVER THE MENAI STRAITS.
The suspension bridge is used for ordinary traffic and the tubular bridge by the London and North-Western Railway.



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BETHESDA SLATE QUARRIES.

SUGGESTIONS.

1 Draw a map of the north coastal regions and Anglesey, marking the places mentioned along the coast, and indicating the position of Snowdon and the course of the Dee.

2. 'Aber' is the Welsh for the confluence of one river with another or with the sea; 'llan' means the site of a church; 'caer,' or 'car,' is a castle. Think of some Welsh place-names in which these occur.

3. Procure a map showing the railways of North Wales, and state how their directions have been influenced by the relief of the land.

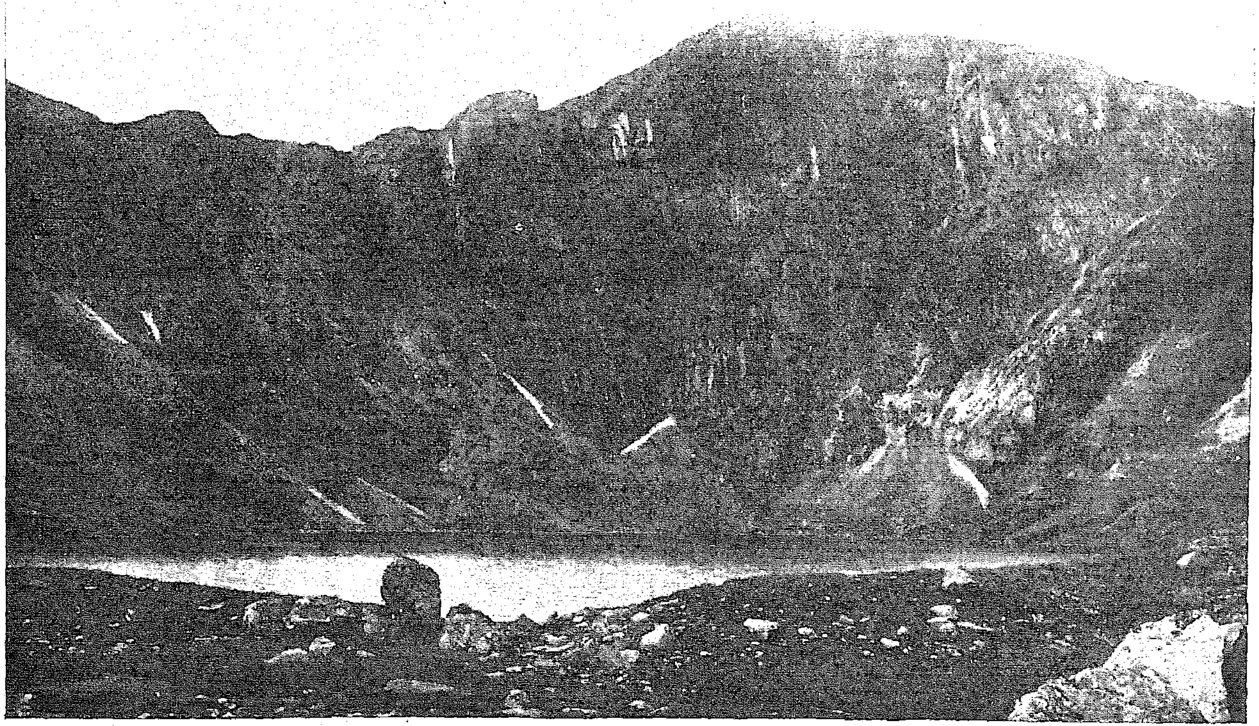
SOUTH WALES.

Much of this district is over 1,000 feet high, the highest parts being in the north. The mountains of East Cardigan have grassy, rounded summits, and are utilized as sheep-walks; but far more impressive are the Black Mountains, which stretch eastwards and westwards, and include the graceful peaks of the Brecon Beacons, composed of old red sandstone. The Taff, Tawe, Neath, and other small rivers which rise in the Black Mountains, besides the Towy and Usk, flow into the Bristol Channel by valleys possessed of great natural beauty, but in some cases now spoilt by mines.

The rich coal-field which occupies much of West Monmouthshire, North Glamorgan, and South Carmarthen affords employment to a large number of the inhabitants; and though iron-ore has now to be imported, mainly from Spain, as the local supply is comparatively little worked, there are great smelting works in the district. The hard anthracite coal of the west is much valued for certain industries where great heat is required, while the rich eastern supplies of 'steam' coal are largely used for marine purposes. Railways have been constructed along the valleys for the conveyance of the coal and iron from such mining and smelting centres as Merthyr Tydvil and Aberdare in the north to Newport, Cardiff, Barry, Neath, Swansea, and Llanelly on the coast.

Cardiff, with Barry, exports yearly more than one-third of the value of the total export of coal from the United Kingdom. Cardiff is the largest town in the Principality, and the harbour benefits by the high tides of the Severn estuary, there being a rise of thirty-three feet at high-water. There are large iron-works in the vicinity, and the population of the place has rapidly risen to nearly 190,000. The town possesses a university college. Within a mile or two of Cardiff is Llandaff, with its cathedral.

West of Cardiff the undulating belt of country between the mountains and the sea, called the Vale of Glamorgan, is extremely picturesque and



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CADER IDRIS AND LLYN-Y-CADER.

The ridge of mountains of which this marks the highest summit, about 2,900 feet high, stretches east and west. Notice the 'screes,' or piles of rock waste, that have *fallen down the sides of the mountain*, and testify to the erosion that is going on.

fertile. The county Glamorgan possesses several small market towns, as Cowbridge and Bridgend, and a remarkable number of ruined castles, a very fine one being situated at Caerphilly. The fertility of the coastal belt, in fact, early attracted invaders, who gradually pushed as far west as Pembroke, and built castles to insure the subjugation of the Welsh. The churches in this area are also famous on account of the number of early Christian crosses they contain—pre-eminently Llantwit Major, a few miles south of Cowbridge, which was the site of a famous Christian university in medieval times.

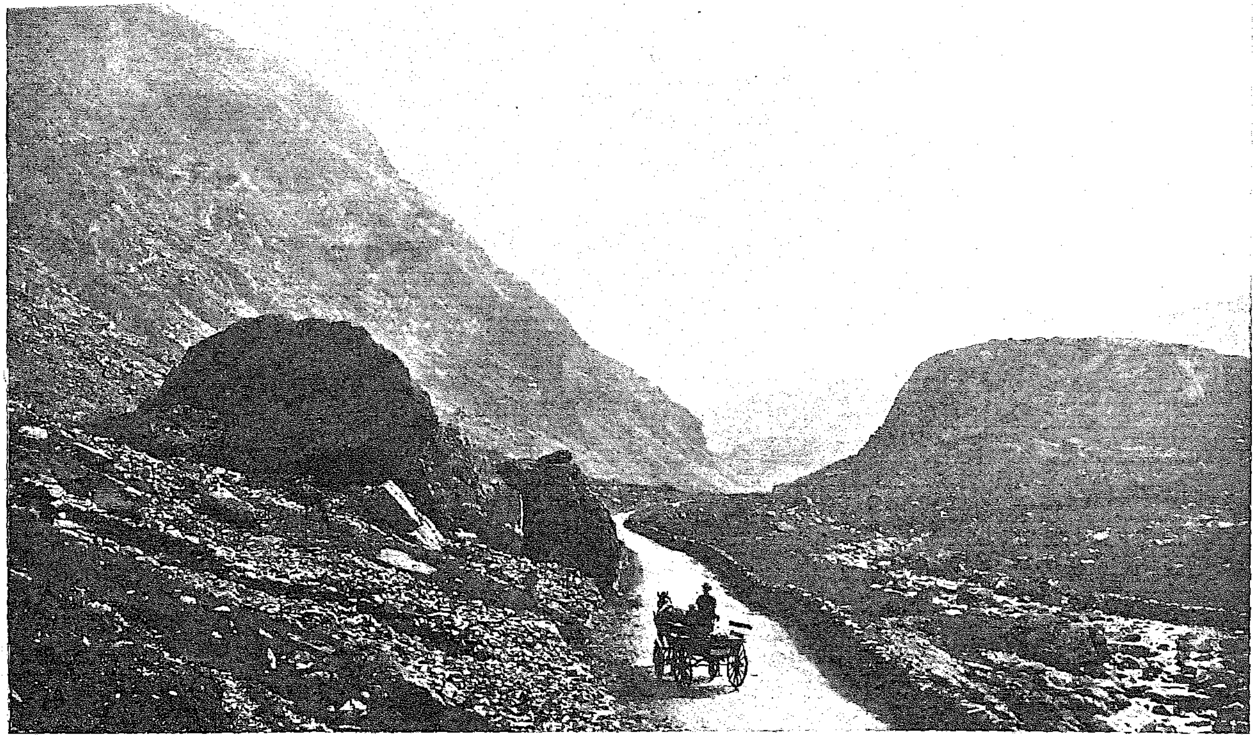
The two great bays—Swansea and Carmarthen, with miles of blown sand around their coasts—are divided by the striking limestone cliffs of the Gower peninsula, which terminates in Worm's Head. At Swansea and Llanelly there are large tin and copper works, though both these metals have to be imported. Tenby, on the Pembrokeshire coast, is a seaside resort, near which the limestone cliffs occur again, and, worn by the sea, form striking isolated rocks called 'stacks.'

The coast of Pembrokeshire was long ago submerged, so that the valleys have become fjord-like inlets. The word 'ford' in Milford simply means fjord, and shows that the Norse settlers saw the similarity of this inlet to those in Norway. In the time of Henry I. some Flemings settled in Pembrokeshire, so that it is less Welsh in many respects than other parts, and is sometimes known as 'Little England beyond Wales.' The fine natural Haven, or harbour, of Milford is utilized by the Royal Navy, for which ships are built at Pembroke Dock; and Fishguard, to the north, is a packet-station for Rosslare in Ireland, and a calling-place for some of the American liners.

St. Bride's Bay is surrounded by rugged cliffs, the haunt of many sea birds, while a little inland lies the little town of St. David's, with its interesting cathedral (see p. 101). Turning St. David's Head, the cliffs recede eastwards to Cardigan, at the mouth of the Teify, and then the coast becomes low and featureless. There is a theological college at Lampeter on the Teify.

QUESTIONS AND SUGGESTIONS.

1. Contrast North and South Wales.
2. Draw a map of the south coastal district, marking the chief indentations, rivers, and ports.
3. What are the best routes of communication between (*a*) the towns in Wales which possess university colleges, (*b*) those possessing cathedrals?
4. Compare the relative facilities of Cardiff and Newcastle for supplying the London area with coal: (*a*) by rail, (*b*) by sea.



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LLANBERIS PASS.

Notice the huge boulders on the left which were probably brought hither by glaciers long ago and deposited when they melted.

THE ISLE OF MAN.

THIS island is situated in the Irish Sea, almost equally distant from England, Scotland, Ireland, and Wales, and forms a favourite holiday resort for the Lancashire people. The surface is mountainous, save in the extreme north, the chief peak being Snaefell, about 2,000 feet high. The chief industries are fishing, centred at Peel, stock-raising, and lead-mining. The people are a branch of the Gaelic race, and enjoy complete Home Rule. Douglas and Ramsey are popular resorts on the coast.

THE CHANNEL ISLES.

THE islands of Jersey, Guernsey, Alderney, and Sark, off the coast of France, belong to the United Kingdom, but are mainly self-governing, though for some purposes they are attached to Hampshire.

Granite occurs in places, and is used for building as well as being exported. The red colour of the rugged coasts adds to the picturesqueness of the islands, and contrasts well with the exceptionally blue waters of the surrounding sea. The peculiarly mild, sunny climate favours the growth of fruits and early vegetables, and grapes and tomatoes are raised in large quantities under glass in Guernsey. The orchards which formerly covered a good deal of Jersey have been largely cut down to give place to potatoes, though here and there some remain, and the noted small fawn-coloured cows may often be seen tethered under the trees, to consume to the utmost the available grass and other fodder crops.

The natives speak a dialect of French origin, and French is the official language, but English is rapidly becoming common everywhere. Steamers run daily from St. Heliers, the chief town of Jersey, to Weymouth in about seven hours in fine weather, and to Southampton in about nine hours, touching on the way at St. Peter Port in Guernsey.

QUESTION AND SUGGESTIONS.

1. Draw a map of the English Channel, inserting the chief indentations and promontories of the English and French shores respectively, the chief ports, the Isle of Wight, and Channel Isles. *Indicate the regular steamer routes to France from the south coast ports.*
2. What parts of the Isle of Man are most densely peopled, and why ?
3. Discuss the relative advantages of the Scilly Isles and the Channel Isles for supplying the London market with early vegetables.

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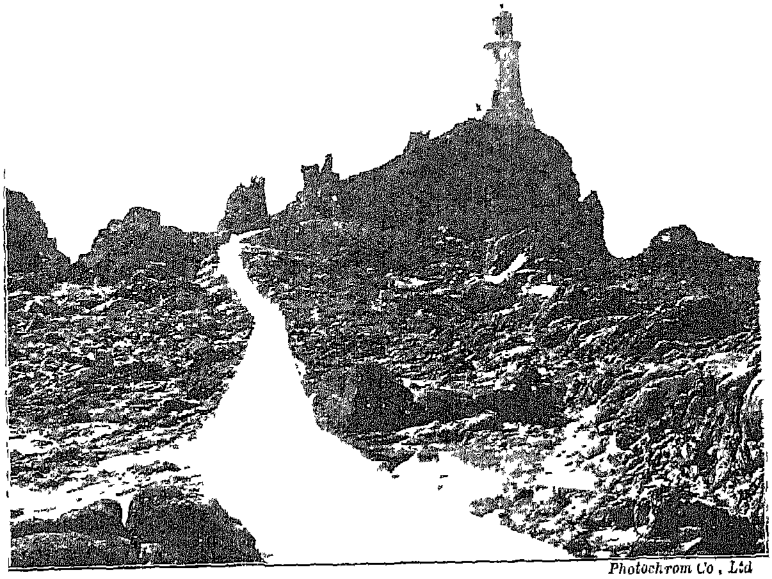
ST. PATRICK'S ISLE, PEEL.

This islet, which is joined to the town of Peel by a causeway, attracted settlers in early days on account of its facilities for defence, and possesses the ruins of a castle, round tower, cathedral, and palace.



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THE CORBIÈRE LIGHTHOUSE OFF THE SOUTH-WEST COAST OF JERSEY.

The granite rocks shown in this view are covered with water at high tide.

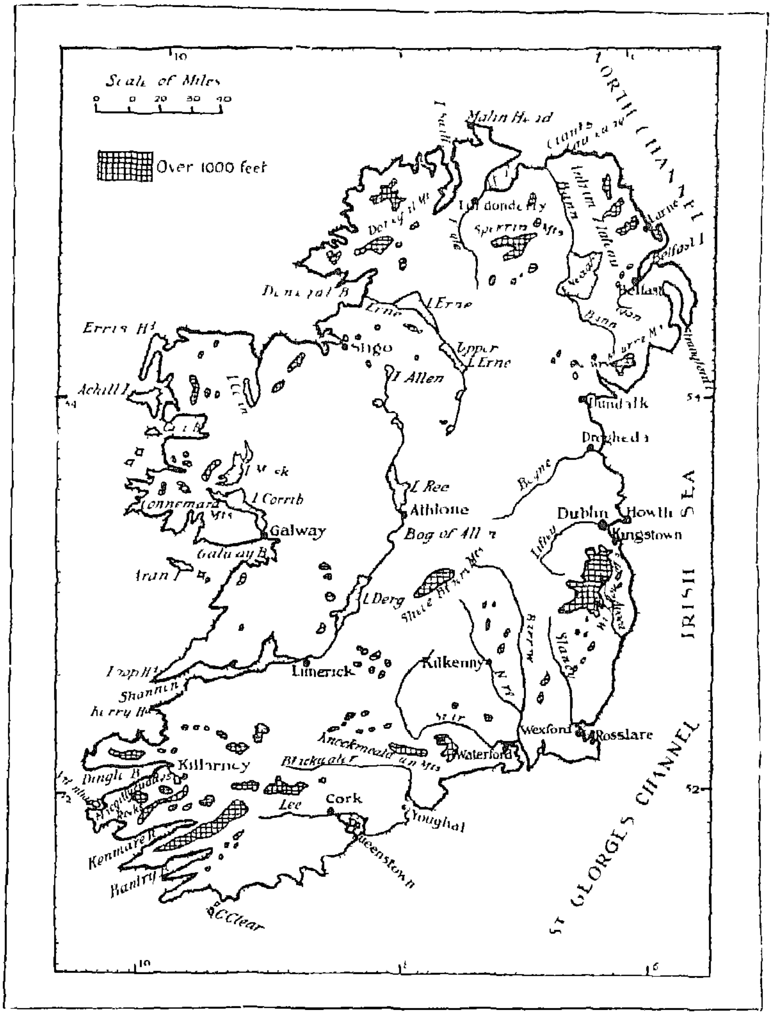
IRELAND.

Ireland is rather larger than Scotland, and is separated from Great Britain by the shallow waters of the North Channel, Irish Sea, and St. George's Channel. The isolation of Ireland partly accounts for the absence of certain reptiles which are found in Great Britain, the distinct character of the inhabitants, and the extent to which antiquities have been preserved there.

From the position of Ireland with regard to Great Britain and the configuration of the opposing coastal regions, it will be seen that the natural routes of intercommunication are as follows: (1) Between Stranraer and Larne, where the North Channel is particularly narrow. Also between Belfast and Fleetwood in Lancashire, as well as between Belfast and Liverpool, and Belfast and the ports of the Clyde and Ayrshire. (2) Between Holyhead and Dublin, where, on the one hand, the coastal plain of North Wales leads through the Cheshire plain into the heart of England, and, on the other, the lowlands behind Dublin permit of routes easily diverging over Ireland. On account of Dublin's rather inferior harbour, it has an outport in Kingstown, which mails from Holyhead reach in about three hours. (3) Between places along the shores of the Bristol Channel, where the Severn defines a route into England, and the natural harbours along the south-east coast of Ireland at the mouths of rivers forming routes inland. There are now regular steamers between Fishguard, in Pembroke, and Rosslare, near Wexford, as well as between Milford Haven and Waterford, and Bristol and Wexford.

The surface of Ireland consists of a large central plain crossed by a few hills, and surrounded by mountainous districts in the north, west, and south. On the east this plain extends to the coast between Dublin and Dundalk, while westwards it reaches the series of lakes between Killala Bay and Galway, and is divided into two by the Shannon, which forms the boundary between Leinster and Connaught. The basin-like shape of Ireland and its heavy rainfall account for its numerous slow-flowing rivers and shallow lakes, and partly for the bogs in the central plain.

These bogs are due to shallow, stagnant lakes being gradually filled up through the growth of a kind of moss called 'sphagnum,' ferns, heaths, and grasses, which in time decay and assume the appearance of level stretches of stiff, fibrous mud. Red or dark brown is the usual colour of bogs, but black bogs occur on the mountains, where constant condensation of moisture stimulates the growth of bog-forming vegetation. It is possible to walk over some bogs, but others are dangerous quagmires,



IRELAND: PHYSICAL AND POLITICAL.

and a few, situated on slopes, have occasionally flowed down the valleys as streams of liquid mud, heavy rains having caused the interior material to swell, and burst through the matted vegetation above. The stiffer bogs are cut up into oblong pieces of peat, or turf, which are piled up in heaps till they are dry enough to be used as fuel* that has about half the heating power of coal (see p. 113). Altogether nearly a quarter of Ireland is waste land, for, besides the bogs, which cover over one-eighth of the country, some of the mountainous districts are unproductive, and some parts are too stony for cultivation. Of the four provinces into which Ireland is divided, Leinster is most and Connaught least fertile. Fortunately, however, there are several districts of remarkable fertility, while the mild, damp climate produces such rich pasturage that Ireland is sometimes called the 'Emerald Isle.' Horses, cattle, and pigs are reared in large numbers, while the common crops are oats and. notably, potatoes (see pp. 25 and 27).

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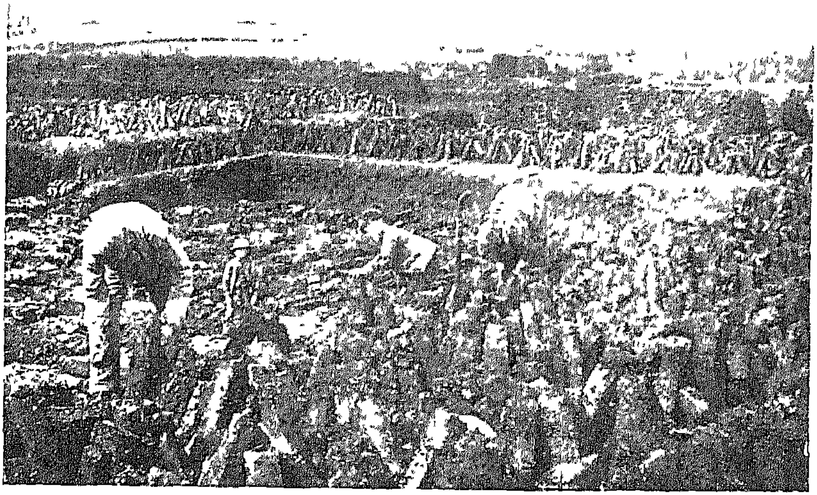
* It has recently been discovered that peat, even undried, can be used in making gas, and machinery for this purpose is about to be erected on the Bog of Allen.

The scarcity of coal in Ireland has hindered the growth of manufacturing industries in recent times, so that the chief occupations of the people have to be pastoral and agricultural; and where the soil is poor the population only exists in a state of misery. In some parts the usual dwelling-places are one-roomed thatched cottages, which lack the charm of gardens, and have a poverty-stricken, untidy appearance. Fowls and even pigs promiscuously wander in and out of many of those which are inhabited, while the number of dilapidated cottages illustrates the decrease in population that has been going on since 1845—the year before the great potato famine—down to 1911 (see p. 116). It has been proposed that Ireland become a Free State in the British Empire with a Constitution like that of Canada. At present there is a Provisional Government for Ireland, with the exception of most of Ulster, with a Parliament sitting in Dublin. The Parliament of the Northern Irish Government sits in Belfast.

Ireland is politically divided into the provinces of Ulster, Leinster, Connaught, and Munster, and it falls naturally into the mountainous districts in the north, south-east, south-west, and west, which form the nuclei of these provinces, in addition to the central plain, the greater portion of which constituted the ancient province of Meath. As Reclus has stated in his work on the British Isles (Chapter XV.): 'The distribution of the mountain groups and the configuration of the coast explain, in a measure, the fate of the country. . . . Ulster was, above all, exposed to incursions from the Scotch; Leinster and Meath appeared to be intended by Nature to fall an easy prey to the English; whilst Munster, on the open Atlantic, attracted Phœnicians and, later on, Spaniards, Algerians, and French to its hospitable bays. Connaught, the most remote of the provinces, afforded a last refuge to the indigenous population flying before conquering invaders.'

For further information on the economic geography of Ireland than can be given here, the student will do well to consult the volume on Ireland, recently issued by the Department of Agriculture and Technical Instruction. The first chapter in it, by G. Cole, gives a good account of the topography and geology of the land, and concludes as follows: 'It may be that one should be born a peasant among the



W. Lawrence, Dublin.

STACKING TURF ON A BOG TO DRY FOR FUEL.

purple hills of Connaught to know to the full the enduring fascination of the land. But to all of us it may be given to stand in some great meadow of the midland, and to hear the plovers calling, and to see the plain melt, as it were, against a soft and cloud-filled air; or to view from some high brown moorland the streamlets starting on their courses, and far below, in the peaceful combe, the gleaming of a rock-girt lake; or again, at evening, to rest amid the crescent of the sandhills, our ears filled with a murmur of Atlantic waves, and to catch far off, against the gold of the sunset, some glimpses of the "Fortunate Isles."'

THE CENTRAL PLAIN.

The prevailing rock in the interior of Ireland—gray carboniferous limestone—is constantly in evidence in the cottages and walls dividing the fields, built of loose stones, and in the slabs of bare rock protruding in places through a thin coating of soil or bog. Long ago there must have been layers of coal on top of this limestone, but these unfortunately have been worn away by various natural agencies, save in a few small areas, as around Kilkenny.

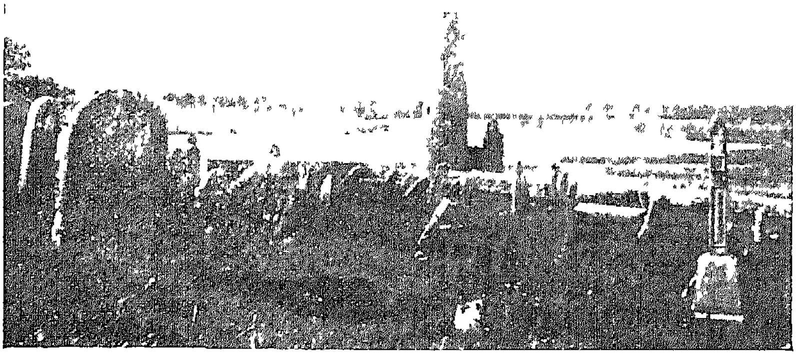
The bogs which in places overlie the limestone vary in thickness from a few to fifty feet, and the largest is that of Allen, which occupies much of King's County and West Meath. Sometimes a bog is cut away for fuel down to the soil on which it rests, and then grass and crops can be grown on the land thus reclaimed. Fragments of oak and other trees, black with age, are occasionally found in the bogs, and the hard bog-oak is carved into numerous objects for sale. Heather, the scented 'bog-myrtle,' and various grasses grow over the bogs; but their aspect is monotonous and melancholy from the absence of trees, clear running water, and the scarcity of animal, including human, life. Such streams as flow through the bogs are generally sluggish and dark-hued on account of the peat, while the roads in parts partake of the nature of causeways.

The lakes and bogs of the interior have prevented Ireland from having any natural geographical centre, and the capital, Dublin, is situated at the head of a beautiful bay on the east coast, protected by the bold promontory of Howth Head on the north, and overlooked by the Wicklow Mountains on the south. The city contains many handsome public buildings, fine parks, and streets traversed by numerous electric cars. Distilling whisky and brewing stout are among its few industries. The present Bank of Ireland occupies the building used as the Irish House of Parliament till 1800.

The Liffey could easily be bridged at Dublin, while the flat nature of the plain to the west facilitated the construction of railways radiating in all directions, and of canals connecting the city with Lough Ree (Royal Canal) and the Shannon, farther south (Grand Canal). The latter has a branch to the river Barrow (see p. 9). Dublin is thus in an extraordinary degree a centre for collecting goods for export, and for distributing imports throughout the country.

Other outlets, for the live stock and dairy produce of the rich eastern plain, are Drogheda, at the mouth of the Boyne, and Dundalk. Both these places have also linen industries. The valley of the Boyne is rich in antiquities, and is also noted for its historical associations from the days when the Kings of Ireland dwelt on the Hill of Tara in county Meath to the battles of the seventeenth century.

In the centre of Ireland are the small market towns and military centres of Mullingar and Athlone, the latter commanding an important route across the Shannon. On the banks of this river, about eight miles south of Athlone, at Clonmacnoise, are the ruins of seven very old churches and two round towers. Such towers, of which more than seventy exist in Ireland, are supposed to have been built as belfries, watch-towers, and places of refuge in early times; they are always near ecclesiastical buildings, and have entrances only accessible by ladders.



ROUND TOWER AT CLONMACNOISE ON THE BANKS OF THE SHANNON

W. Lawrence, Dublin.

COTTAGE AT THE GAP OF DUNLOE, NEAR KILLARNEY.

Notice the 'jaunting car,' the typical conveyance throughout Ireland, on which the passengers sit back to back and face sidewards.

The Shannon, which is rich in trout and salmon, expands in places into shallow, island-studded lakes, as Lough Ree and Lough Derg, and has a sinuous, sluggish course until, south of the little cathedral city Killaloe, it forms slight rapids. Save for this interruption, it is navigable nearly to its source, and is connected with Belfast by way of the Erne, Blackwater, Lake Neagh, and the Lagan, joined together by canals, as well as with Dublin (see p. 9). Limerick, at the head of its estuary, is the great port of the West of Ireland, exporting dairy produce and large quantities of bacon, which is cured there, and importing mainly wheat and maize. Lace is manufactured there.

West of the Shannon the central plain touches the Atlantic at Sligo and Galway, both of which places have a considerable trade in fish. The chief fish caught in the sea off Galway are herring, mackerel, flat-fish, and lobsters, while salmon abound in the Corrib River. The little whitewashed, thatched cottages of the bare-footed fisherfolk form a striking suburb of the somewhat decayed town of Galway. At the entrance to Galway Bay are the Aran Islands, famous for the remains of old stone forts and primitive churches. The inhabitants earn a precarious living by fishing and pastoral pursuits.

Lough Corrib is connected with Lough Mask by a river which is subterranean on account of the porous nature of the limestone. Further north occurs another shallow lake—Lough Conn—which is drained to Killala Bay.

QUESTIONS AND SUGGESTIONS.

1. Which of the routes from Great Britain to Ireland will be most used, and why ?
2. Compare and contrast Dublin with Edinburgh and London.
3. Draw a map of the Shannon, marking the places mentioned in the text.
4. Describe two routes from Galway to London.
5. Why are the fisheries off the west coast of Ireland not so important as those off the east coasts of Scotland and England ?
6. Construct a diagram to show the relative size of the populations of England and Wales, Scotland and Ireland according to the censuses of 1801, 1821, 1841, 1861, 1881, 1901, and 1911. The figures below state the populations approximately in millions and one decimal of a million.

	1801.	1821.	1841.	1861.	1881.	1901.	1911.
England and Wales -	8·9	12·0	15·9	20·6	26·0	32·5	36·0
Scotland - - -	1·6	2·0	2·6	3·0	3·7	4·5	4·7
Ireland - - -	5·4	6·8	8·2	5·8	5·2	4·5	4·3

W. Lawrence, Dublin

GLEN INAGH AND THE TWELVE PINS, CONNEMARA.

Connemara is the name given to the western portion of County Galway

WESTERN CONNAUGHT.

The series of lakes above-named occur where the limestone changes to far older rocks. The rounded mountains, called the Twelve Bens, or Pins, in Connemara consist of quartzite, whilst others around Clew Bay are chiefly formed of granite. Some of these are about 2,500 feet high On account of the mild climate, the mountain slopes are frequently covered far up with grass and heathery bog, while beneath the roads in places are lined with hedges of fuchsias. The coast is remarkably fine, and resembles Scotland in the fjord-like openings, bold cliffs, and numerous islands. The cliffs of Achill Island are extremely precipitous, and many tourists visit these parts in summer for the sake of the scenery.

Since the land is largely barren, the inhabitants have a hard struggle for existence. Some quarry the green marble found in Connemara, some fish ; but the majority tend herds of small black cattle and horned sheep, and grow potatoes. The organization called the Congested Districts

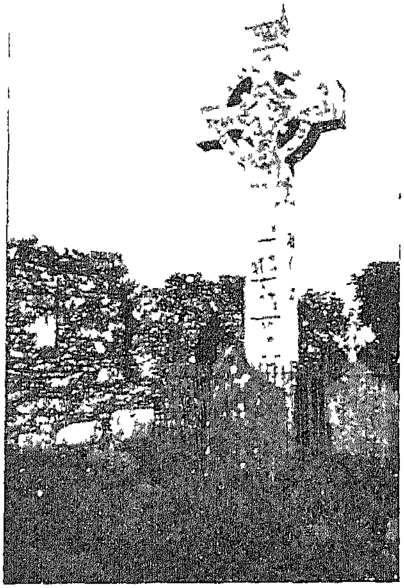
Board has done a little in this and other poor parts of Ireland towards improving the condition of the people. It has helped them, for example, to buy fishing apparatus and land, to improve the breeds of cattle, and to build piers and light railways. Hand industries, such as spinning and *weaving wool, are also being revived and carried on by women in their* cottages. In these western parts the native Irish language, which is akin to the Gaelic of the Scotch Highlands, is far more common than in the east, though it is now being taught in the schools, and otherwise encouraged in many parts of Ireland.

SOUTHERN IRELAND.

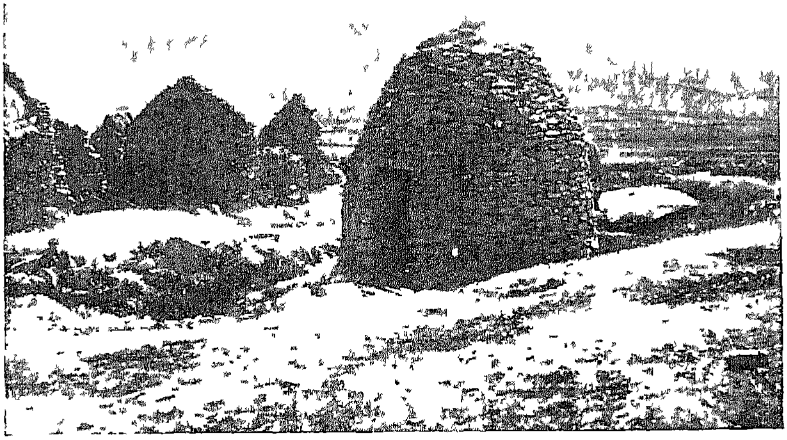
The mountain ranges in the south-west, such as the McGillycuddy Reeks, Galtee, and Knockmealdown Mountains, mainly run east and west, and the intermediate valleys are occupied by the rivers Bandon, Lee, Blackwater, and Lower Suir. In the south-east the Slaney, Barrow, Nore, and Upper Suir have, on the contrary, a north to south direction. The mouths of all these rivers form fine natural harbours, and Kinsale, Cork, Youghal, Waterford, and Wexford have a busy export trade in cattle, dairy produce, and eggs. On an island in Cork Harbour stands Queenstown, an important packet station for England and America. Regular steamers go between Waterford and Milford Haven in about six and a half hours.

The western coast of Munster is broken by the inlets of Bantry Bay, Kenmare River, Dingle Bay, and Tralee Bay, which have been formed by the submergence of original valleys. From Valentia Island, and from Ballinskelligs Bay to the south, cables are laid under the ocean to Newfoundland, so that news can travel quickly between the United Kingdom and America. The coast scenery is remarkably grand, and the old red sandstone, which occurs largely in this region, gives a warm aspect to the landscape. Some old stone forts, beehive-shaped stone huts, and other antiquities have been preserved on the Dingle promontory.

County Kerry is famous for the beautiful scenery of the three lakes of Killarney (see p. 123), which are all interconnected by narrow channels. The McGillycuddy's Reeks, including Carntual, the highest mountain in Ireland (3,400 feet), hem in the lakes on the west, and the charming combination of mountains, luxuriant vegetation, and water yearly attracts a large number of tourists. The wood of the arbutus, which grows wild there, is carved into small objects for sale.



Cross at Monasterboice in the Boyne Valley.



Round Stone Hut near Dingle.

Such huts were built for human habitation, but are now only used as outhouses.

The district between Limerick and Cashel, in Tipperary, has been called the Golden Vale, on account of its fertility. Wheat is grown there, while barley flourishes best in County Wexford. Cashel is a small town at the foot of a remarkable isolated rock of limestone, on the top of which natural fortress are the ruins of a royal castle, a chapel, a cathedral, and a round tower. Kilkenny, to the north-east on the Nore, is near a small coal-field, and black marble is also found in the neighbourhood. It has a large corn trade, and possesses an imposing castle and beautiful cathedral.

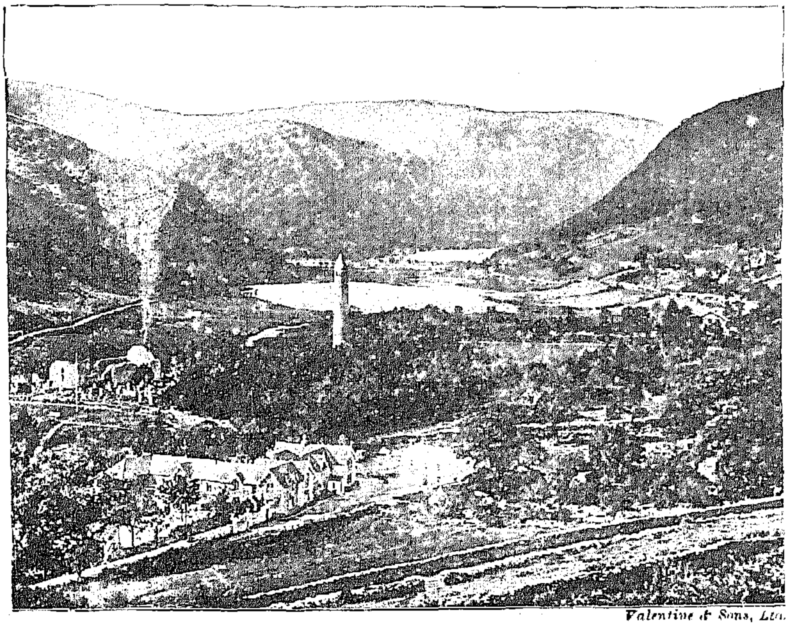
The county of Wicklow is occupied by a great group of granite mountains intersected by deep, picturesque glens, which in places are beautifully decked with forests of oak and beech trees. Particularly famous for their beauty are the valleys of the Avoca, and of its tributary the Avonmore, at Glendalough, where seven little stone churches and a round tower were built long ago (see p. 121). Granite and slate are quarried in the county. The towns of Bray and Wicklow are popular seaside resorts.

QUESTIONS AND SUGGESTIONS.

1. Describe a voyage from Cork to Dublin, noting the places that might be called at *en route*, and illustrate by a sketch map.
2. Mention any town on the east coast of England about the same latitude as Cork, and contrast the climate of the two, giving reasons for differences.
3. Study a railway map of Southern Ireland, and state in what respects the railway system has been influenced by the relief of the land. Why is there no continuous line closely following the south coast between Wexford and Cork ?
4. Mention any areas in the United Kingdom where falling water could probably be utilized as a source of power for manufacturing industries, and state in what respects, if any, these districts would compare unfavourably with the the coal-fields as sites for factories.
5. Ireland lies between the meridians of 5° and 11° W. How do these lines run with regard to Great Britain and the Continent ?

NORTHERN IRELAND.

This constitutes the province of Ulster, where the inhabitants, save in Donegal, differ in many respects from those in the rest of Ireland. This is partly on account of the number of Scotch who settled here, largely in the seventeenth century, and who are Protestants, whilst the majority of the Irish are Roman Catholics, and partly because the population is able to depend on industries as well as on agricultural and pastoral pursuits.



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GLENDALOUGH

The ruins of one of the seven little churches can be seen on the left of the view. Notice the tiny little lakes which occur in the upper course of the Avonmore.

According to the geological structure of the land, the province falls into the mountainous masses which form the hearts of the counties of Down, Antrim, Londonderry, and Donegal, and are separated by the rivers Newry, Lagan, Bann, Foyle, and Erne. The Bann drains the large, shallow, rectangular-shaped Lough Neagh, and the Erne passes through two lakes. Enniskillen is situated where the river is bridged between the lakes.

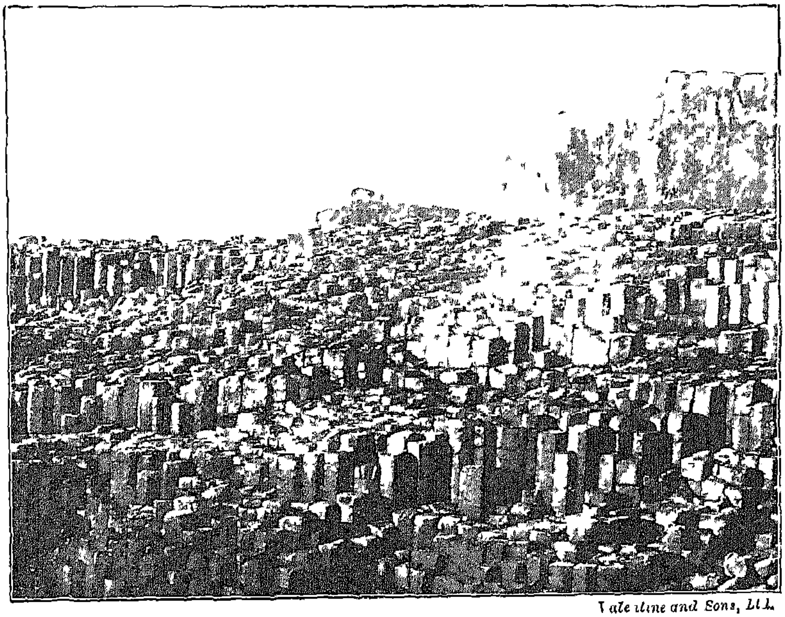
The Mourne Mountains are of granite, and lie between Carlingford Lough and Dundrum Bay, while further north is Strangford Lough. There is a regular line of steamers between Greenore, at the entrance of Carlingford Lough, and Holyhead, whilst Newry, on the Newry Canal, is a small port also noted for a linen industry. Armagh, the ecclesiastical capital of Ireland, is another linen-manufacturing town; but the centre of this industry is Belfast, where the water is excellent for bleaching purposes. Flax is grown in the neighbourhood, but has also to be imported from Russia and Belgium. Belfast also distils whisky, makes ropes, and has a thriving shipbuilding industry, to support which coal and iron can be easily imported from the Scotch, Cumberland, and Lancashire fields. Some coal and iron are found in Antrim, and coal also occurs in Tyrone, south-west of Lough Neagh, but not nearly sufficient for the demand.

Antrim consists of a limestone and chalk plateau capped with basalt, a rock which is of volcanic origin, and must have once flowed over the land like lava. Both rocks are exposed in the cliffs along the coast. The basalt in cooling long ago shrank, so that it cracked and assumed the same curious columnar appearance as in Staffa (see p. 39). A good example of this kind of structure is shown in the Giant's Causeway, which has the appearance of an artificial pier of broken vertical pillars, on the top of which it is possible to walk, as the pieces fit closely together. Most of the pillars have six sides, so that, seen from above, the Causeway resembles a piece of honeycomb. Fair Head and other parts of the coast exhibit the same striking structure. Farther east is Londonderry, an old walled town noted in history, and well situated for a port at the mouth of the Foyle. Linen is manufactured there.

Donegal, like Western Connaught, consists of very old rocks, largely granite, and has the same type of coast and mountain scenery, and similar poverty among the scattered Irish-speaking inhabitants. Most of the men are engaged in small farming and fishing, and attempts are being made to revive such home industries as lace-making and weaving among the women. The coast is deeply indented, Donegal Bay and Lough Swilly being the two largest inlets; but even the ports, like Moville, where ocean steamers touch, and Donegal, are very small towns, and places inland can only be said to be villages.

QUESTIONS AND SUGGESTIONS.

1. Compare Donegal with Argyleshire in Scotland, and Belfast with Glasgow.
2. The six chief ports of Ireland in order of population are Greater Dublin, Belfast, Cork, Londonderry, Limerick, and Waterford. Point out the natural advantages in the situations of each, and state the probable exports.
3. Draw a map of the east and south coasts of Ireland, and of the west coasts of Scotland, England, and Wales between the latitudes of 51° and 55° N. Insert the chief ports on both sides, the steamer routes mentioned on p. 110, and the islands of Anglesey and Man.
4. Compare the advantages of Glasgow and Liverpool in supplying Belfast with coal. From what other ports would the town be also likely to obtain supplies of this commodity?
5. Why has no part of Ireland so heavy a rainfall as some places in the English Lake District, though the country is situated further west?



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THE GIANT'S CAUSEWAY.

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THE LAKES OF KILLARNEY.

INDUSTRY AND COMMERCE.

The magnitude of a country's commerce will largely depend on (1) the amount and value of the goods it produces or manufactures, and therefore can supply both to its own inhabitants and those of other lands ; (2) the number and wealth of its inhabitants, and therefore the amount and value of the goods that the country demands and can purchase both at home and abroad ; (3) the facilities that exist for collecting and distributing goods both throughout the home country and to and from foreign parts. We have a great trade because we produce much, consume much, and have great facilities for transporting goods.

The following are some of the reasons why we are a great producing and, above all, a manufacturing country : (1) The climate is generally suitable for agriculture, and it is specially favourable for the cotton industry in South Lancashire. (2) The soil is fertile over a great part of the country, and in places there are rich supplies of such valuable minerals as coal and iron. (3) The people are, on the whole, hard-working and enterprising. (4) Partly for these reasons we have been able to amass capital to finance large industrial undertakings.

Our most important manufacturing industry is that of cotton, centred in South Lancashire, but also carried on in the Scottish plain and at Nottingham (see pp. 46, 64, 70). The iron industry is carried on at and around Middlesbrough, Barrow, and Birmingham, in the basin of the Clyde, and in Glamorganshire and Monmouthshire, while the cutlery industry is centred at Sheffield (see pp. 16, 46, 58, 60, 64, 68, 104). Shipbuilding, now practically a branch of the iron industry, is chiefly pursued at the ports on the Clyde, Tees, Wear, and Tyne (see pp. 48, 58, 121). The woollen industry is mainly centred in West Yorkshire, though it is also pursued in the Tweed basin, in the West of England, and in the Upper Severn valley (see pp. 50, 60, 70, 74, 102). Of less importance are the manufactures of chemicals in South Lancashire and the Tyne basin, linen at Belfast and other places in North Ireland, jute at and near Dundee, earthenware and porcelain in North Staffordshire, and of silk, glass, leather, etc., in various scattered towns (see pp. 58, 64, 121, 45, 68, 70, 77, 82).

We cannot produce enough food for our large population, so we export large quantities of our coal and manufactured goods to pay for the food and raw materials that we require. In 1921 we exported the following

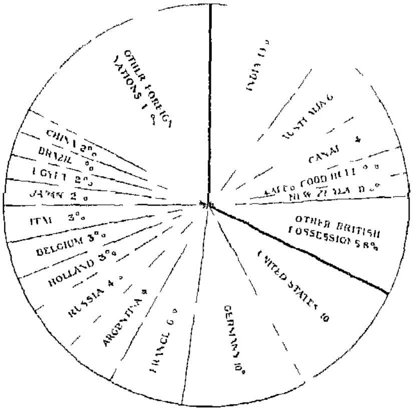


Diagram showing the Proportionate Average Annual Value of our Exports to Various Countries for 1911, 1912, and 1913

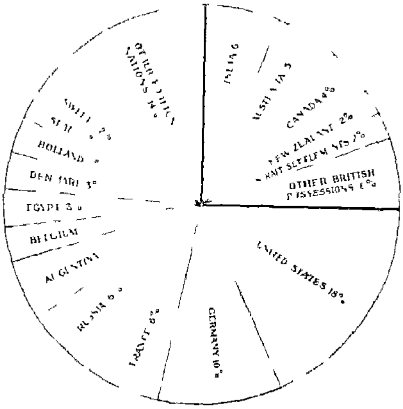


Diagram showing the Proportionate Average Annual Value of our Imports from Various Countries for 1911, 1912, and 1913.

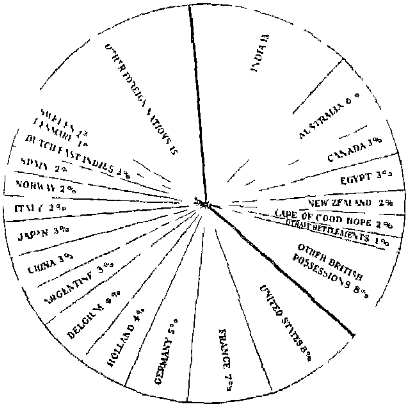


Diagram showing the Proportionate Value of our Exports to Various Countries for 1921.

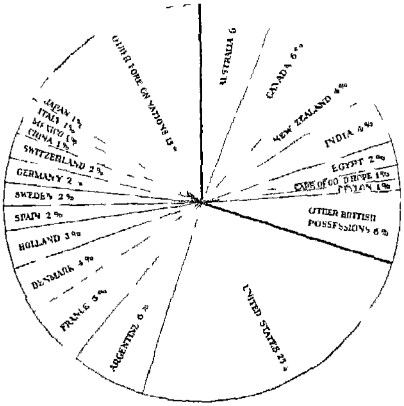


Diagram showing the Proportionate Value of our Imports from Various Countries for 1921.

The figures after the countries indicate the percentage value.

articles produced in the United Kingdom approximately to the following values given in million pounds: Cotton manufactures and yarn, 178; iron, steel, and manufactures of the same, including machinery, hardware, and cutlery, 63; coal, 42; woollen and worsted manufactures and yarn, 42; ships and boats, 29; spirits, 8.

In 1921 the total value of British goods exported amounted to £703,000,000, but we also exported £107,000,000 worth of imported goods in the same condition as we had received them. Our large trade of this nature, called entrepôt trade, is partly due to our position between great commercial nations on the mainland of Europe and the United States, and partly to the fact that ships, after taking abroad such bulky commodities as coal and cotton goods, bring back goods, as ballast, that we do not require, and which can therefore be resold cheaply to other nations.

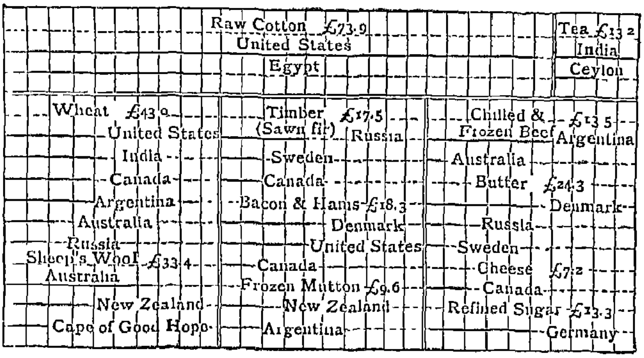
The chief articles that we import are food and raw materials. In 1921 we imported the following goods to the following values given approximately in million pounds: meat, including bacon and ham, 135; wheat and wheat-flour, 89; raw cotton, 72; petroleum, 51; butter, 42; wool, 41; sugar, 35; timber, 30; tea, 23; iron and steel manufactures, 22; tobacco, 22; maize, 18; cheese, 17; eggs, 15; wood pulp, 12; vegetables, 12; motor cars and cycles, 10; barley, 10; rubber, 9; fish, 9; lard, 9; linseed, 8.

The total value of our imports amounted to £1,085,000,000—far more than the value of our exports. This at first seems strange, and like receiving more than we pay for, but is partly due to the fact that in years past this country has lent money to other countries, and now receives yearly interest on it. Many men also earn abroad in maritime, military, or civil services what they spend at home.

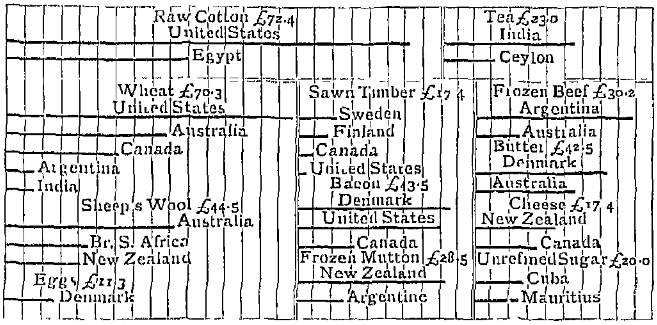
Our internal or home trade is helped by the existence of good roads, numerous railways, canals, and navigable rivers, while our external trade is facilitated by the central position of the country, the nearness of every place to the coast, and sometimes to more than one coast, the numerous good harbours, the size of the British possessions, and the magnitude of British shipping, the last partly the result of these same conditions.

The value of a port mainly depends on (1) the wealth of the region behind it—*e.g.*, its hinterland—from which it chiefly draws its exports, and to which it chiefly sends its imports; (2) the ease with which it can communicate with its hinterland; (3) the size and depth of the harbour, and the protection it affords from storms; (4) its position with regard to large foreign commercial towns and the great trade routes between them. Many of our seaports have a depth of 25 feet at high water, some of them more than this, and thus they are suited for very large vessels. The chief ports, in order of the total net tonnage of the vessels that arrived at and departed from them in 1919, are London, Liverpool with Birkenhead, Cardiff, the Tyne ports, Plymouth, Hull, Glasgow, Newport, Swansea, Falmouth, Southampton, Manchester, and Middlesbrough.

COUNTRIES FROM WHICH SOME OF OUR IMPORTS WERE DERIVED. THE VALUES GIVEN ARE THE AVERAGES FOR THE YEARS 1911, 1912, AND 1913.



COUNTRIES FROM WHICH SOME OF OUR IMPORTS WERE DERIVED IN 1921.



The distance between the vertical lines represents two million pounds in value. In each case the total value of the import in million pounds is given after the name of the article imported.

By the diagrams on pp. 125 and 127 you will see with what countries we chiefly trade, and from which we receive most of certain commodities. The value of our total trade—*e.g.*, total imports and exports—was, in 1921, about £1,896,000,000. For revenue purposes a duty has to be paid on a few articles imported into this country, such as wines and spirits, tobacco, tea and coffee, while some articles manufactured abroad are also taxed when imported with the idea of protecting certain British industries.

QUESTIONS AND SUGGESTIONS.

1. Think of some other food products, besides those mentioned in the list, which we must import because we cannot grow them. Are any of these the raw materials of any British manufactures ?
2. Get the time-tables of the chief railway companies and find out the chief towns on the main lines. Compare the railway maps with physical maps of the same districts, and see what natural difficulties have had to be avoided or overcome in the construction of the lines.
3. Make a diagram to illustrate the proportionate value of our chief exports, and another of the chief imports.
4. Find out from the 'Statesman's Year-Book' the value of the total trade of the United States and of France, and compare the results with that of the United Kingdom.
5. By what routes could you best travel from your home to (*a*) London, (*b*) Edinburgh, (*c*) Cardiff, (*d*) Dublin ? About how long would the journey occupy in each case ?
6. From what ports would you probably take steamer for Ireland, Norway, United States, Belgium, and France respectively ? About how long would the voyage occupy in each case ?
7. Name some of the chief British possessions. Find out from the 'Statesman's Year-Book' the size and population of these, and compare them in these respects with the United Kingdom.
8. Why are there so few ports of any note on the west coast of Ireland, while there are so many excellent sites for harbours ?
9. Construct a diagram to show the growth of our total trade from 1900—1920 inclusive. The following figures are taken from the 'Statesman's Year-Book' (1922), and given in million pounds: 1900 - 877 ; 1901 = 869 ; 1902 = 877 ; 1903 = 903 ; 1904 - 922 ; 1905 = 973 ; 1906 - 1,068 ; 1907 = 1,161 ; 1908 = 1,040 ; 1909 = 1,094 ; 1910 = 1,212 ; 1911 = 1,237 ; 1912 = 1,343 ; 1913 = 1,404 ; 1914 = 1,223 ; 1915 = 1,336 ; 1916 = 1,552 ; 1917 = 1,660 ; 1918 1,848 ; 1919 = 2,594 ; 1920 = 3,489.
10. From what ports abroad would the imports given in the diagram on p. 127 be probably sent to us; by what routes would they come, and at what ports would they be likely to be received in large quantities ?
11. Why is such a large proportion of our trade with the United States ?
12. What are the commercial advantages and disadvantages of living on an island ?

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